



IOWA MOLD TOOLING CO., INC.

P.O. Box 189  
Garner, IA 50438  
Tel: 641.923.3711  
Fax: 641.923.2424  
[www.imt.com](http://www.imt.com)

**Manual # 99906483**

# **RCL 5300 Safety System Instruction Manual**

**Revised: July 1, 2019**

Copyright © 2019 Iowa Mold Tooling Co., Inc.  
All rights reserved

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without the prior written permission of Iowa Mold Tooling Co., Inc.

**Iowa Mold Tooling Co., Inc. is an Oshkosh Corporation Company**



## **Contents:**

<b>Chapter</b>	<b>Page</b>
<b>1. Introduction</b>	<b>9</b>
<b>2. The functioning of the loader safety system</b>	<b>9</b>
<b>2.2 The RCL 5300 TCL Safety System</b>	<b>10</b>
<b>2.4 Data registration</b>	<b>11</b>
<b>4. The controller's indicator panel</b>	<b>12</b>
<b>4.1 Press buttons and indicators</b>	<b>12</b>
<b>4.3 Display Indications</b>	<b>16</b>
<b>4.4 In general about indications on the indicator panel</b>	<b>17</b>
<b>5. Starting up and end of loader operation</b>	<b>18</b>
<b>5.1 Starting up of the loader</b>	<b>18</b>
<b>5.3 The controller in stand-by mode</b>	<b>19</b>
<b>6. Signalling during loader operation</b>	<b>19</b>
<b>6.1 Load indication</b>	<b>19</b>
<b>6.2 Indication of 90% load moment</b>	<b>20</b>
<b>6.3 Indication of load moment, loader or Fly-Jib</b>	<b>20</b>
<b>7. Signalling in case of overload – RCL 5300 SLM</b>	<b>21</b>
<b>7.1 When the max. load moment is 100%, the controller indicates as follows:</b>	<b>21</b>
<b>7.2 After a short dump period, the controller indicates as follows:</b>	<b>21</b>
<b>7.3 Erroneous operation after a dump period:</b>	<b>22</b>
<b>7.4 Absolute stop in case of overload</b>	<b>22</b>

<b>8.</b>	<b>Signalling in case of overload – RCL 5300 TCL</b>	<b>23</b>
<b>8.1</b>	<b>When the max. load moment is 100%, the controller indicates as follows:</b>	<b>23</b>
<b>8.2</b>	<b>When all the control valve's levers are back in neutral position again:</b>	<b>23</b>
<b>8.3</b>	<b>Erroneous operation after deactivation of the TCL:</b>	<b>23</b>
<b>9.</b>	<b>The override function</b>	<b>24</b>
<b>9.1</b>	<b>The main boom locked in vertical position</b>	<b>24</b>
<b>10.</b>	<b>Absolute stop in case of override</b>	<b>25</b>
<b>11.</b>	<b>Emergency operation of the loader</b>	<b>25</b>
<b>11.</b>	<b>Stop button</b>	<b>26</b>
<b>13</b>	<b>Disconnection of buzzer</b>	<b>26</b>
<b>14.</b>	<b>Oil temperature monitoring</b>	<b>27</b>
<b>14.1</b>	<b>Warning at high oil temperature</b>	<b>27</b>
<b>14.2</b>	<b>Stop of loader in case of critically high oil temperature</b>	<b>27</b>
<b>15.</b>	<b>2-stage Load Moment Limitation (LMB)</b>	<b>28</b>
<b>15.1</b>	<b>The safety system</b>	<b>28</b>
<b>15.2</b>	<b>Configuration of the 2-stage LMB</b>	<b>28</b>
<b>15.3</b>	<b>Working in the stable slewing area</b>	<b>28</b>
<b>15.4</b>	<b>Slewing with a too large load moment towards the unstable slewing area</b>	<b>29</b>
<b>15.5</b>	<b>Working in the unstable slewing area</b>	<b>29</b>
<b>16.</b>	<b>EVS - Electronic Vehicle Stability</b>	<b>30</b>
<b>16.1</b>	<b>The EVS System</b>	<b>30</b>
<b>16.2</b>	<b>Configuration of the EVS System</b>	<b>30</b>
<b>16.3</b>	<b>Mode of operation of the EVS System</b>	<b>31</b>

<b>16.4</b>	<b>Load Moment Limitation (LMB) and Electronic Vehicle Stability (EVS)</b>	<b>32</b>
<b>16.5</b>	<b>Calibration of the EVS-System</b>	<b>32</b>
<b>16.5.1</b>	<b>Calibration when starting up</b>	<b>33</b>
<b>16.5.2</b>	<b>Automatic calibration</b>	<b>33</b>
<b>16.5.3</b>	<b>Calibration during loader operation</b>	<b>33</b>
<b>16.5.4</b>	<b>Optimisation of calibration</b>	<b>34</b>
<b>16.5.5</b>	<b>Manual calibration</b>	<b>36</b>
<b>16.6</b>	<b>Starting up of the loader</b>	<b>36</b>
<b>16.6.1</b>	<b>Start up procedure</b>	<b>36</b>
<b>16.7</b>	<b>Signalling during loader operation</b>	<b>37</b>
<b>16.7.1</b>	<b>Indication at heel</b>	<b>37</b>
<b>16.7.2</b>	<b>Indication at a 90% heel</b>	<b>37</b>
<b>16.7.3</b>	<b>Indication at the max. permissible heel</b>	<b>38</b>
<b>16.7.4</b>	<b>Indication after the EVS stop</b>	<b>38</b>
<b>16.7.5</b>	<b>Erroneous operation after an EVS stop</b>	<b>39</b>
<b>16.7.6</b>	<b>SIM-stop at a heel exceeding the marginal value</b>	<b>39</b>
<b>16.8</b>	<b>Especially for loaders equipped with HDL</b>	<b>40</b>
<b>16.9</b>	<b>Override and EVS</b>	<b>40</b>
<b>16.10</b>	<b>Good advice for unproblematic operation of the loader</b>	<b>41</b>
<b>16.11</b>	<b>Warning</b>	<b>41</b>
<b>17.</b>	<b>Safety system, stand-up controls, HS</b>	<b>42</b>
<b>17.1</b>	<b>The safety system</b>	<b>42</b>
<b>17.2</b>	<b>Configuration of the safety system for stand-up controls</b>	<b>42</b>

<b>17.3</b>	<b>Slewing limitation, stand-up controls</b>	<b>43</b>
<b>17.4</b>	<b>Warning during slewing movement over stand-up controls</b>	<b>43</b>
<b>17.5</b>	<b>Combination of 2-Stage LMB and safety system for stand-up controls</b>	<b>43</b>
<b>18.</b>	<b>Heavy Duty Lifting, HDL 2</b>	<b>44</b>
<b>18.1</b>	<b>The HDL System</b>	<b>44</b>
<b>18.2</b>	<b>Configuration of HDL 2</b>	<b>44</b>
<b>18.3</b>	<b>RCL 5300 SLM and the HDL System</b>	<b>44</b>
<b>18.4</b>	<b>RCL 5300 TCL and the HDL System</b>	<b>45</b>
<b>18.5</b>	<b>Proportional HDL</b>	<b>45</b>
<b>18.7</b>	<b>HDL indication</b>	<b>46</b>
<b>19.</b>	<b>The RCL 5300 TCL Safety System for Fly-Jib</b>	<b>46</b>
<b>19.1</b>	<b>The safety system</b>	<b>46</b>
<b>19.2</b>	<b>Configuration, Fly-Jib</b>	<b>47</b>
<b>19.3</b>	<b>Mode of operation of the safety system</b>	<b>47</b>
<b>19.4</b>	<b>Loader operation with and without Fly-Jib</b>	<b>48</b>
<b>19.5</b>	<b>Loader operation with Fly-Jib</b>	<b>48</b>
<b>19.6</b>	<b>Loader operation without Fly-Jib</b>	<b>48</b>
<b>19.7</b>	<b>Monitoring of the socket-outlet and plug</b>	<b>48</b>
<b>19.8</b>	<b>Signalling during loader operation with Fly-Jib</b>	<b>49</b>
<b>19.9</b>	<b>When the max. load moment of the Fly-Jib is 100%, the controller indicates as follows:</b>	<b>49</b>
<b>19.10</b>	<b>Warning when working with loader and Fly-Jib</b>	<b>50</b>
<b>20.</b>	<b>The RCL 5300 TCL Safety System for winch</b>	<b>50</b>

<b>20.1</b>	<b>The safety system</b>	<b>50</b>
<b>20.2</b>	<b>Configuration, winch</b>	<b>51</b>
<b>20.3</b>	<b>Mode of operation of the safety system</b>	<b>51</b>
<b>20.4</b>	<b>The functioning of the safety system</b>	<b>52</b>
<b>20.5</b>	<b>Signalling during loader operation with winch</b>	<b>56</b>
<b>20.6</b>	<b>Load indication for winch</b>	<b>56</b>
<b>20.7</b>	<b>Indication at a winch load of 90%</b>	<b>56</b>
<b>20.8</b>	<b>Indication at a winch load of 100%</b>	<b>56</b>
<b>20.9</b>	<b>Indication in case of not enough wire on the winch drum</b>	<b>57</b>
<b>20.10</b>	<b>Indication in case of too much wire on the winch drum</b>	<b>57</b>
<b>20.11</b>	<b>Warning when working with loader and winch</b>	<b>58</b>
<b>21.</b>	<b>Electric activation, loader functions / stabilizers</b>	<b>59</b>
<b>21.1</b>	<b>Operation of the stabilizer functions</b>	<b>59</b>
<b>21.2</b>	<b>Operation of the loader functions</b>	<b>59</b>
<b>21.3</b>	<b>Emergency operation of the stabilizer functions</b>	<b>60</b>
<b>22</b>	<b>Blue Mode functions</b>	<b>61</b>
<b>22.1</b>	<b>Operation of Blue Mode Functions</b>	<b>61</b>
<b>23</b>	<b>Indication system, manual extensions</b>	<b>62</b>
<b>23.1</b>	<b>In general about manual extensions</b>	<b>62</b>
<b>23.2</b>	<b>The indication system</b>	<b>62</b>
<b>23.3</b>	<b>The functioning of the indication system</b>	<b>63</b>
<b>23.4</b>	<b>Using the indication system</b>	<b>63</b>
<b>23.5</b>	<b>The indication system in Blue Mode</b>	<b>64</b>

<b>23.6</b>	<b>Example of a working situation</b>	<b>65</b>
<b>23.7</b>	<b>Warning when working with manual extensions</b>	<b>65</b>
<b>24</b>	<b>Activation of optional extras</b>	<b>66</b>
<b>24.1</b>	<b>Activation of horn</b>	<b>66</b>
<b>24.2</b>	<b>Activation of working light</b>	<b>66</b>
<b>24.3</b>	<b>Indication of working hours</b>	<b>67</b>
<b>25</b>	<b>Service functions</b>	<b>68</b>
<b>25.1</b>	<b>Service indicator</b>	<b>68</b>
<b>26</b>	<b>Errors in the safety system</b>	<b>68</b>
<b>26.1</b>	<b>Error indication</b>	<b>68</b>
<b>26.2</b>	<b>Interference from the safety system in case of errors</b>	<b>69</b>
<b>26.3</b>	<b>Emergency operation of the loader</b>	<b>69</b>
<b>27</b>	<b>Troubleshooting</b>	<b>70</b>
<b>28</b>	<b>Technical Data RCL</b>	<b>71</b>





## **1. Introduction**

This operation manual on electronic safety systems is meant for the user of the loader and must be considered as a supplement to the instruction manual for the individual loader series.

Certain safety systems are described in the manual; these systems are not standard with the loader, but an optional extra.

The electronic loader safety systems are based on different types of controllers, which are designated RCL 5300, RCL 5301 and RCL 5305.

The loader model as well as the type of optional extras determine which of the above-mentioned controllers is fitted on the loader in question.

The user interface and the indications are identical for the different types of controllers, which will be called RCL 5300 in the following.

A common characteristic of the safety systems is that the controller is constantly monitoring the loader's conditions as regards load moment, operation and function.

## **2. The functioning of the loader safety system**

The basic principle of the RCL Safety System is to secure the loader against overloading and the consequences of this. I.e. independent of the operator's doings, the system prevents that the max. permissible load moment is exceeded (load moment limitation - LMB).

The controller monitors the pressure transducers mounted on the boom cylinder. The pressure transducers register the hydraulic pressure, which is an indication of the load moment on the loader. The controller registers according to the signal from the pressure transducers, when the loader has reached its max. permissible load moment and gives signal to the hydraulic system of stopping the load moment increasing movements.

Intervention from the safety system depends on the configuration of the operating system:

- The basic safety system is the RCL 5300 SLM, which stops all loader movements for a shorter or longer period, depending on the working conditions of the loader.
- If the loader is remote controlled, the safety system is the RCL 5300 TCL, which stops the loader movements selectively. I.e. only load moment increasing movements are stopped, but load moment reducing movements can still be activated.

When starting up the RCL Safety System, it is indicated during 2 seconds on the display whether the safety system is the SLM or TCL type.



## 2.1 The RCL 5300 SLM Safety System

Movements blocked in case of overload:

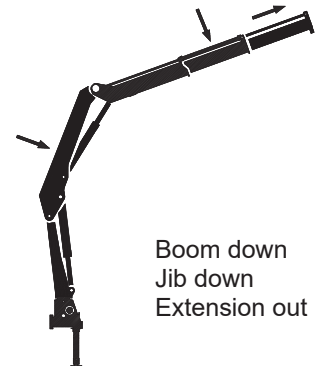
- In case of max. load moment (the diodes up to 100% are lit) all loader movements are stopped as indicated by the arrows.
- The control levers can be operated but building up of a hydraulic pressure in the system is not possible (the dump valve opens so that the oil from the pump flows to tank).
- After a certain non operational time – dependent on how many times the loader has been working with load moment increasing movements, as well as on how big an increase it has been exposed to – all loader functions can be operated again (the dump valve closes so that the oil from the pump can flow to the loader cylinders).



## 2.2 The RCL 5300 TCL Safety System

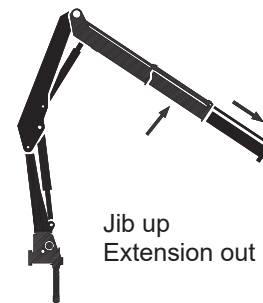
Load moment increasing movements blocked in case of overload:

**Jib at an angle between 0° and + 90°.**



**Jib at an angle below 0°**

- In case of max. load moment (the diodes up to 100% are lit) the load moment increasing movements are stopped as indicated by the arrows.
- The control levers can be operated by activating load moment increasing loader movements as indicated by the arrows, but building up of a hydraulic pressure in the system is not possible (the dump valve opens so that the oil from the pump flows to tank).
- Load moment reducing loader functions as well as the slewing movement can be operated freely (the dump valve closes so that the oil from the pump can flow to the loader cylinders).





### **2.3 Warning when working with the loader safety system!**

- The loader safety system increases safety in connection with loader operation, but being the operator you are still responsible for safe operation of the loader.
- Push the stop button if a dangerous situation occurs. Please see the relevant chapter.
- Be careful when cleaning the loader. Avoid spraying on water and never use high-pressure rinsing for cleaning the electronic components. Also be careful not using noxious chemicals and detergents.
- Troubleshooting must only take place according to this manual; then contact an authorized IMT Service Point.
- Remove the cable for the power supply, if the battery of the vehicle is discharged, and connect a "boost starter" to start the engine. Any kind of too high power supply or voltage peaks entail the risk of overloading and in the worst case damaging the electronic safety system.
- Remove the cable for the power supply, if you are to weld on the vehicle, otherwise it may entail the risk of overloading and in the worst case damaging the electronic safety system.
- Do not connect any electric equipment to the RCL Safety System.

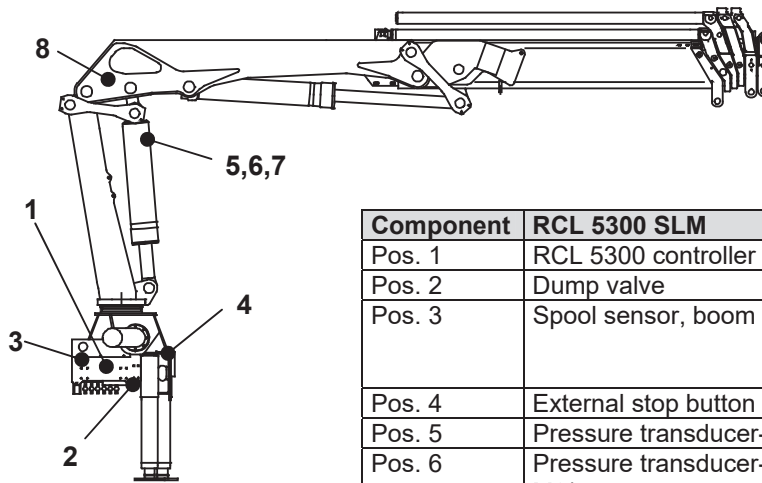
### **2.4 Data registration**

The RCL 5300 controller currently collects data. I.e. information on load moment, operation, function and service conditions are stored in memory registers.

The information can be read by connecting either a service terminal or a PC during the regular service overhauls at an IMT Service Center.



### 3. Configuration of the RCL 5300 Safety System



Component	RCL 5300 SLM	RCL 5300 TCL
Pos. 1	RCL 5300 controller	RCL 5300 controller
Pos. 2	Dump valve	Dump valve
Pos. 3	Spool sensor, boom	Spool sensor, boom, jib and extension (excl. in case of radio remote control)
Pos. 4	External stop button	External stop button
Pos. 5	Pressure transducer-M1	Pressure transducer-M1
Pos. 6	Pressure transducer-M2*	Pressure transducer-M2*
Pos. 7	Pressure transducer-MC1**	Pressure transducer-MC1**
Pos. 8		Horizontal sensor

\*) Depending on the equipment of the loader, an extra pressure transducer-M2 may be fitted.

\*\*) Depending on loader model, an extra pressure transducer-MC1 may be fitted.

### 4. The controller's indicator panel

#### 4.1 Press buttons and indicators

It is important that the operator is familiar with and knows the function of the press buttons and indicators on the controller's indicator panel.

The indicator panels of the different types of controllers are identical as regards function.

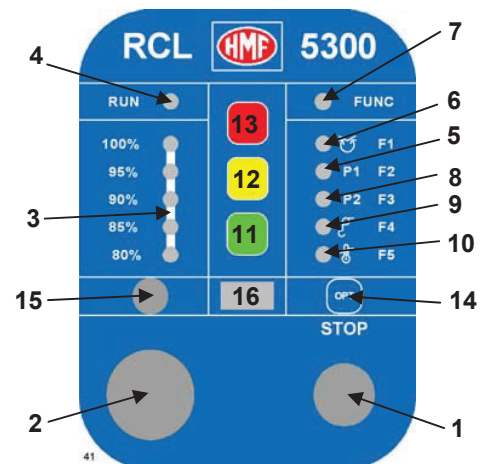
- The RUN diode is green
- The FUNC diode is yellow.
- The other diodes are red.

In the following table you will see a short description of the functions of the indicator panel. Furthermore you will find a more detailed explanation of the functions in this instruction manual.

In general about the diodes and the buzzer:

- Flashing diodes and a periodic signal from the buzzer warn before a loader stop.
- Diodes that are constantly lit and a constant signal from the buzzer mean loader stop.

**Please note** that several diodes are used in connection with optional extras, which are not necessarily fitted on the loader in question.





## 4.2 The functions of the indicator panel

Indicator panel	Function
<b>1. Stop button</b>	If a dangerous situation occurs during loader operation, push the stop button and all loader functions are thus stopped.
<b>2. Buzzer (indicator)</b>	<p>Gives a periodic signal:</p> <ul style="list-style-type: none"> <li>At a load moment of <math>\geq 90\%</math> on the loader.</li> <li>When overriding the safety system.</li> <li>In case of any kind of warning from the safety system concerning the load on the loader, the Fly-Jib or the heel of the vehicle (EVS).</li> <li>In case of system error without any safety risk.</li> <li>When the stabilizer function is activated.</li> </ul> <p>Gives a constant signal:</p> <ul style="list-style-type: none"> <li>At a load moment of 100% on the loader.</li> <li>In all situations where a loader stop occurs.</li> <li>In case of system error with a safety risk.</li> </ul>
<b>3. The 80%, 85%, 90%, 95% and 100% diodes</b>	<p>The SLM Safety System.</p> <ul style="list-style-type: none"> <li>Indicates a load moment between 80% and 100%.</li> <li>All diodes are flashing for a certain period at a load moment of 100% and are then constantly lit, when it is possible to work with the loader again right after the loader stop.</li> </ul> <p>The TCL Safety System.</p> <ul style="list-style-type: none"> <li>Indicates the load moment of the loader between 80% and 100% when the P1 diode is flashing.</li> <li>Indicates the load moment of the Fly-Jib between 80% and 100% when the P2 diode is flashing.</li> <li>Indicates the load on the winch between 80% and 100% when the P1 diode is flashing.</li> <li>Indicates the heel (EVS) between 80% and 100% of the max. permissible heel, when the slewing diode (F1) is flashing.</li> <li>All diodes are constantly lit in case of a load moment on the loader of 100%, a load moment of the Fly-Jib of 100%, a load on the winch of 100% and in case of 100% of the max. permissible heel (EVS). The above-mentioned situations entail loader stop.</li> </ul>
<b>4. The RUN diode</b>	<ul style="list-style-type: none"> <li>Is constantly lit when the safety system functions normally.</li> <li>Is flashing in case of an error in the safety system.</li> <li>Is flashing at the same time as the FUNC diode (the same frequency), if the radio remote control system of the loader has not been started up.</li> </ul>
<b>5. The P1/F2 diode</b>	<p>The SLM Safety System.</p> <ul style="list-style-type: none"> <li>Is flashing when the max. load moment is between 80% and 100%.</li> <li>Is constantly lit for a certain period at a load moment of 100% and is then flashing, when it is possible to work with the loader again right after the loader stop.</li> <li>Is constantly lit in all situations where a loader stop occurs.</li> </ul> <p>The TCL Safety System.</p> <ul style="list-style-type: none"> <li>Is flashing when the max. load moment is between 80% and 100%.</li> <li>Is constantly lit at a load moment of 100%, when a control lever for a load moment increasing loader function is activated.</li> <li>Is flashing at a load moment of 100% when the levers of the control valve are in neutral position.</li> <li>Is constantly lit for a certain period at max. heel (EVS) and is then flashing, when it is possible to work with the loader again right after the loader stop.</li> <li>Is constantly lit in all situations where a loader stop occurs.</li> </ul>



<b>6.</b> <b>The Slew/F1 diode</b>	<p>The SLM and TCL Safety Systems.</p> <p>In case of 2-stage load moment limitation, LMB</p> <ul style="list-style-type: none"> <li>• Is flashing when the load moment of the loader is larger than the max. permissible load limit in front of the vehicle.</li> <li>• Is constantly lit for a certain period in case of stop of the slewing movement in the direction in front of the vehicle, when the load moment is larger than the max. permissible limit in this area.</li> </ul> <p>In case of stand-up control (option):</p> <ul style="list-style-type: none"> <li>• Is constantly lit when a slewing movement is stopped before the boom system moves over the stand-up platform.</li> </ul>
	<p>The TCL Safety System.</p> <p>In case of EVS - Electronic Vehicle Stability</p> <ul style="list-style-type: none"> <li>• Is flashing at a heel between 80% and 100% of the max. permissible heel.</li> <li>• Is constantly lit for a certain period in case of loader stop caused by a heel of the vehicle exceeding the max. permissible limit.</li> <li>• Is flashing when it is possible to work with the loader again right after the loader stop.</li> </ul>
<b>7.</b> <b>The FUNC diode</b>	<ul style="list-style-type: none"> <li>• Is flashing when the loader's HDL system is activated.</li> <li>• Is constantly lit for 2 seconds when choosing the stabilizer function.</li> <li>• Is flashing at the same time as the RUN diode (the same frequency), if the radio remote control system of the loader has not been started up.</li> </ul>
<b>8.</b> <b>The P2/F3 diode</b>	<p>The TCL Safety System.</p> <ul style="list-style-type: none"> <li>• Is flashing when the max. load moment of the Fly-Jib is between 80% and 100%.</li> <li>• Is constantly lit at a load moment of 100% of the Fly-Jib, when a control lever for a load moment increasing Fly-Jib function is activated.</li> <li>• Is flashing at a load moment of 100% of the Fly-Jib, when a control lever for a Fly-Jib function is in neutral position.</li> </ul>
<b>9.</b> <b>The winch/F4 diode</b>	<p>The TCL Safety System.</p> <ul style="list-style-type: none"> <li>• Is flashing when the max. load on the winch is between 80% and 100%.</li> <li>• Is constantly lit at a 100% load on the winch, when the control lever for the "winch up" movement is activated.</li> <li>• Is flashing at a 100% load on the winch, when the control lever for the winch is in neutral position.</li> <li>• Is constantly lit at a 100% load on the winch, when a control lever for a loader function or a Fly-Jib function is operated in a direction which may overload the wire.</li> </ul> <p>Wire safety device.</p> <ul style="list-style-type: none"> <li>• Is flashing when there is too much wire on the winch drum. The diode is constantly lit when activating the "winch up" function (winch stop).</li> <li>• Is flashing when there are only 3 winds of wire left on the winch drum. The diode is constantly lit when activating the "winch down" function (winch stop).</li> </ul>
<b>10.</b> <b>The Oil temperature/F5 diode</b>	<ul style="list-style-type: none"> <li>• Is flashing and warning in case of high temperature of the hydraulic oil.</li> <li>• Is constantly lit in case of the temperature of the hydraulic oil exceeding a critically high level. This entails loader stop.</li> </ul>
<b>11.</b> <b>Green press button</b>	<ul style="list-style-type: none"> <li>• One push activates the safety system.</li> <li>• Reduces the sound level/deactivates the buzzer.</li> <li>• One push turns on/turns off the working light.</li> </ul>
<b>12.</b> <b>Yellow press button</b>	<ul style="list-style-type: none"> <li>• Two (2) push change from operation of the loader functions to operation of the stabilizer functions. One (1) push changes back to the loader functions again.</li> <li>• Is used for navigating in Blue Mode.</li> </ul>
<b>13.</b> <b>Red press button</b>	<ul style="list-style-type: none"> <li>• One push activates the HDL system and one push more deactivates the HDL again.</li> <li>• One push makes it possible to override the safety system, when the loader or the Fly-Jib is stopped because of overloading.</li> <li>• One push makes it possible to override the EVS vehicle stability system in case of loader stop caused by a heel of the vehicle exceeding the max.</li> </ul>



	<p>permissible limit.</p> <ul style="list-style-type: none"> <li>• One push makes it possible to override the 2-stage load moment limitation (LMB) in case of loader stop in front of the vehicle.</li> <li>• In case of system error, where the RUN diode is flashing, emergency operation of the loader is possible when the red press button is kept down.</li> <li>• Is used for navigating in Blue Mode.</li> </ul>
<b>14. OPT press button</b>	<ul style="list-style-type: none"> <li>• Activates the horn.</li> <li>• Activates extra functions in Blue Mode.</li> </ul>
<b>15. Diagnostic plug</b>	<ul style="list-style-type: none"> <li>• Plug for connection of service terminal or PC. Only for service personnel.</li> </ul>
<b>16. Display</b>	<p>The 7-segment display shows:</p> <ul style="list-style-type: none"> <li>• Functional status combined with diode indications.</li> <li>• Error codes in case of system errors.</li> <li>• Blue Mode functions.</li> </ul>
<b>Emergency operation of radio remote controlled loader</b>	<ul style="list-style-type: none"> <li>• When the RUN and FUNC diodes are flashing simultaneously, it means that the loader's remote control system has not been activated or has an error.</li> <li>• The yellow and the red press buttons are pushed at the same time, whereby the system changes into emergency operation. I.e. the loader can be operated manually by means of the control levers.</li> </ul>



### 4.3 Display Indications

#### Functional status of the RCL 5300 Safety System

Display	Explanation
	Constantly luminous dot. There is no power supply for the POWER-terminal (DC+). There is power supply for the IGNITION-terminal (IGN).
	Constantly luminous dot. There is power supply for the POWER-terminal (DC+). There is no power supply for the IGNITION-terminal (IGN).
	Running dots from the right to the left. The controller is in "Stand-by" mode. The pump is activated and the RCL system is powered.
	Running dash-dot from the right to the left. The RCL system is ready for operation.
	The <b>S.L.m.</b> is lit for 2 seconds when starting up the system, indicating that the type of safety system is the RCL 5300 SLM. Is lit in case of loader or Fly-Jib stop at a load moment of 100%.
	The <b>t.c.l.</b> is lit for 2 seconds when starting up the system, indicating that the type of safety system is the RCL 5300 TCL. Is lit in case of loader, Fly-Jib or winch stop at a load moment of 100%.
	<b>S.t.P.</b> is lit, indicating "Absolute stop in case of overload" (please see the relevant chapter) of the loader or the Fly-Jib. Override is possible.
	<b>S.t.P.</b> is flashing, indicating "Absolute stop in case of override" (please see the relevant chapter) of the loader or the Fly-Jib. Override is not possible, only "Emergency operation of the loader" (please see the relevant chapter).
	Indication in connection with 2-stage load moment limitation (LMB). <b>2.S.t.</b> is lit when the slewing movement is stopped, if the load moment moved from the stable to the unstable area is too large.
	Indication in connection with stand-up controls, HS. <b>H.S.</b> is constantly lit when a slewing movement is stopped before the boom system moves over the stand-up platform.
	Indication in connection with the EVS vehicle stability system. <b>C.A.L.</b> is lit at the first activation of a loader function right after having operated the stabilizers. The EVS system is waiting for a calibration.
	Indication in connection with the EVS vehicle stability system. <b>E.V.S.</b> is constantly lit in case of loader stop due to the heel of the vehicle exceeding the max. permissible limit, where the vehicle becomes unstable.





	Indication in connection with winch. <b>E.A.S</b> is constantly lit when the ease movement is stopped, when there are 3 winds of wire left on the winch drum.
	Indication in connection with winch. <b>d.r.A.</b> is constantly lit when the hoist movement is stopped in case of the wire overfilling the winch drum.
	Indicates that Blue Mode is activated. Please see the chapter "Blue Mode functions".
	The current temperature between 70 and 79°C flashes, in order to warn about the operating temperature of the hydraulic oil being too high.
	The current temperature between 80 and 99°C is constantly lit, when the loader stops because of the operating temperature of the hydraulic oil being 80 degrees or more.
	The service indication states that there is between 0 and 99 working hours until the next service overhaul of the loader. Each time the safety system of the loader is started up, the display indicates for 10 seconds the time of the next service overhaul.
	The service indication states that there is between 0 and 40 working days until the next service overhaul of the loader. Each time the safety system of the loader is started up, the display indicates for 10 seconds the time of the next service overhaul.
	Luminous numbers between <b>0.0.1.</b> and <b>9.9.9.</b> indicate error codes for different error types in the safety system. Please see chapter on "Troubleshooting".
	Luminous sign (to the left) – flashing sign (in the middle) – luminous sign (to the right): <ul style="list-style-type: none"> <li>• The controller has no program or</li> <li>• The controller is being programmed.</li> </ul>

#### 4.4 In general about indications on the indicator panel

The safety system includes both loader, Fly-Jib, winch and EVS. When the system indicates overload/heel, it is always the function which causes the largest load (loader, Fly-Jib or winch) or heel (EVS) that has priority.

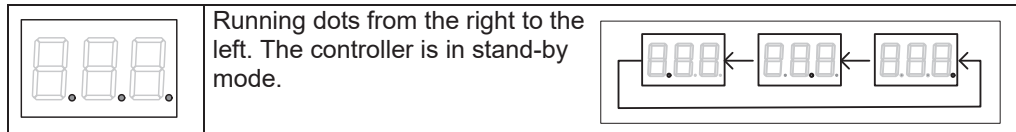


## 5. Starting up and end of loader operation

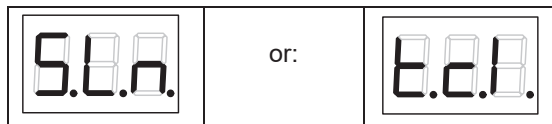
### 5.1 Starting up of the loader

Before starting up, the operator must carry out the following:

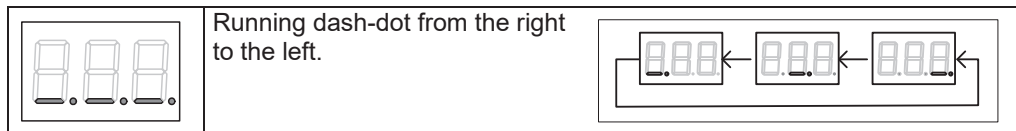
1. Connect the pump (PTO); the controller is thus powered. The display indicates



2. Push the green press button (the safety system is activated). The display shows for approx. 2 seconds the type of safety system: **SLM** or **TCL**.

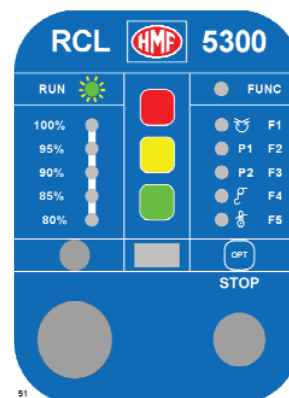


3. Then the display shows:



and the green diode RUN is constantly lit, indicating that the safety system is ready for operation.

4. Prepare the loader for starting up according to the Instruction Manual for the loader.





## 5.2 End of loader operation

After loader operation, push the stop button on the RCL 5300 indicator panel as well as on the remote control box.

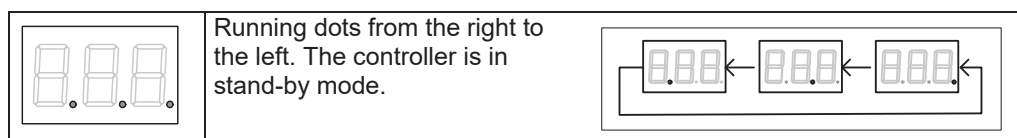
Then stop the pump (PTO), the power for the controller is thus interrupted.

## 5.3 The controller in stand-by mode

The controller has been programmed to switch into stand-by mode after 10 minutes.

I.e. if a certain loader function (with spool sensor) has not been operated for the last 10 minutes, the controller will automatically go into stand by mode where the power consumption is reduced.

The display shows:



The following factors reactivate the controller:

- When pushing the green press button.
- When activating the control lever for the boom function (or dependent on which optional extra is used, any of the control levers with a spool sensor).

## 6. Signalling during loader operation

### 6.1 Load indication

- During loader operation, the red diodes indicate the load moment in percentage between 80% and 100%.
- When the maximum load moment of the loader is between 80% and 100 %, the red P1 diode also flashes.

The following symbols concerning signalling have the following meaning:

Warning		Loader stop	
Flashing diodes		Diodes are constantly lit	
Periodic signal from the buzzer		Constant signal from the buzzer	

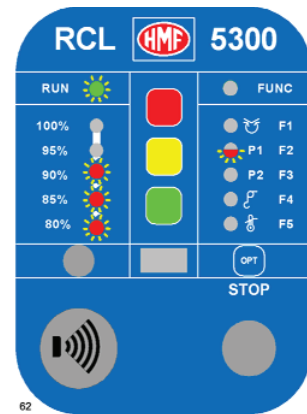


## 6.2 Indication of 90% load moment

- At a load moment of 90%, the red diodes indicating 80%, 85% and 90% are lit.
- The buzzer gives a periodic signal.
- The red P1 diode continues to flash (between 80% and 100%).

The signalling described continues till the load moment gets below 90% again.

**Please note:** that the diodes do not immediately indicate this reduction of the load moment of the loader. A delay has been built into the system to keep the diode indications stable during varying load.



## 6.3 Indication of load moment, loader or Fly-Jib

If the loader is fitted with a Fly-Jib, the loader and the Fly-Jib will rarely have the same load moment.

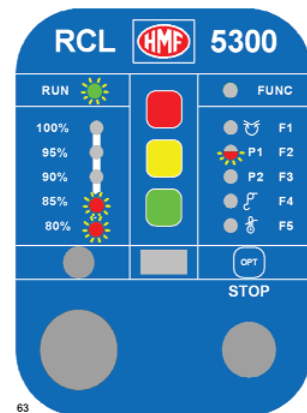
As to the RCL 5300 TCL:

- When the red diode P1 flashes, it means that the *loader* has the largest load moment.
- When the red P2 diode flashes, it means that the *Fly-Jib* has the largest load moment.
- The red 80% through 100% diodes are constantly related to either P1 or P2 (the load moment of the loader or the Fly-Jib).

Only one of the diodes, P1 or P2 is lit at a time. It will

thus be possible during loader operation to follow whether the loader or the Fly-Jib has the largest load moment. This offers the possibility of using the loader/ Fly-Jib to its maximum.

Example: P1 flashes, indicating that the *loader* has the largest load moment. The 80% and 85% diodes are lit, indicating a load moment of 85% on the loader.





## 7. Signalling in case of overload – RCL 5300 SLM

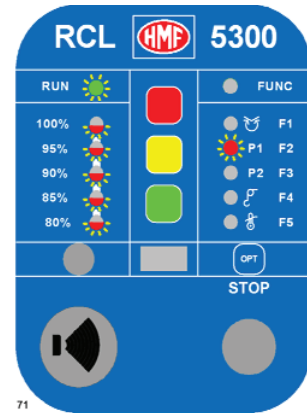
The loader's load moment is constantly checked by an SLM (Superior Load Monitoring) safety system, which is activated if the max. permissible load moment of the loader is exceeded.

### 7.1 When the max. load moment is 100%, the controller indicates as follows:

- All red diodes 80% through 100% are flashing (SLM is activated)
- The buzzer gives a constant signal
- The P1 diode is constantly lit.
- The display indicates **S.L.m.**

The dump valve opens to tank during a certain period (the dump period), and all loader movements are stopped.

**Please note:** When the max. load moment is 100% and all loader movements are stopped, all control levers must immediately be led back into neutral position.



71

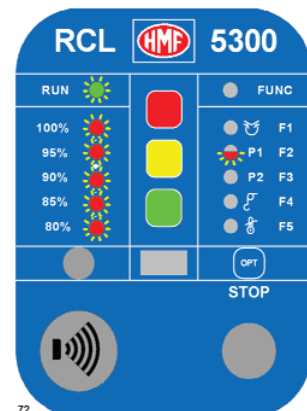


### 7.2 After a short dump period, the controller indicates as follows:

- All red diodes 80% through 100% are constantly lit (SLM is deactivated).
- The buzzer gives a periodic signal.
- The P1 diode flashes.

The dump valve closes to tank, and it will be possible to operate the loader again (the movements must be load moment reducing).

It will however not be possible to operate the loader before the control lever for the boom function (and the slewing function, dependent on optional extras), has been into neutral position.



72



### 7.3 Erroneous operation after a dump period:

In a situation where the loader can be operated again after a dump period, it will be possible to make load moment increasing movements by making an erroneous operation.

In this case of further overloading of the loader, the SLM Safety System will be reactivated and a new and longer dump period will follow (with the diode/buzzer indications as earlier mentioned).

In case of further erroneous operation (overloading) the subsequent dump periods will be increased accordingly.

#### Please note!

- Abusing the SLM-system to deliberately overload the loader is not permitted.
- The first time a loader movement is stopped by the SLM-system because of overloading, all control levers must immediately be led back into neutral position.
- The number of times the loader has been overloaded, how long time it has been overloaded, and how much it has been overloaded, is registered in memory registers. Please see chapter on Registering of Data.
- When the loader is overloaded (the SLM-system is activated), and all loader movements are stopped, the following movements must be load moment reducing movements, when the SLM-system is deactivated after a dump period.

### 7.4 Absolute stop in case of overload

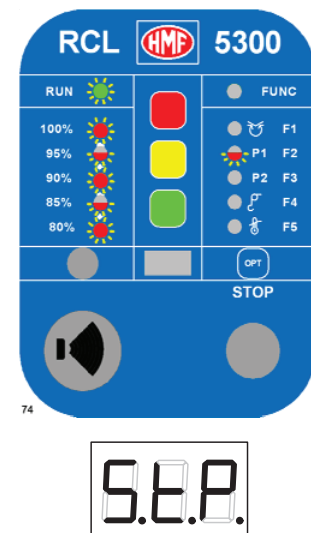
After the loader being into SLM-stop and then by erroneous operation into a further number of stops (with long dump periods), the SLM Safety System will finally go into an absolute stop, and the loader can no longer be operated (loader stop).

#### Indication of absolute stop in case of overload:

- The P1 diode (loader) or P2 diode (Fly-Jib) is flashing.
- The diodes 80% through 100% are constantly lit.
- The display indicates illuminated **S.t.P.** (loader stop)
- The buzzer gives a constant signal

In order to get out of this situation (loader stop), it is necessary to push the *override button*, and at the same time operate load moment reducing movements until the load moment of the loader is below 100%. Afterwards the loader can be operated as usual.

Please also see the chapter on *The override function*.





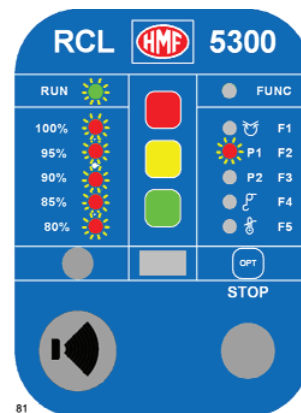
## 8. Signalling in case of overload – RCL 5300 TCL

The loader's load moment is constantly checked by a TCL (Traditional Capacity Limitation) safety system, which is activated if the max. permissible load moment of the loader is exceeded.

### 8.1 When the max. load moment is 100%, the controller indicates as follows:

- All red diodes 80% through 100% are constantly lit (TCL is activated).
- The buzzer gives a constant signal
- The P1 diode is constantly lit.
- The display indicates **T.c.l.**

The dump valve opens to tank and the loader movement causing the overload is stopped.



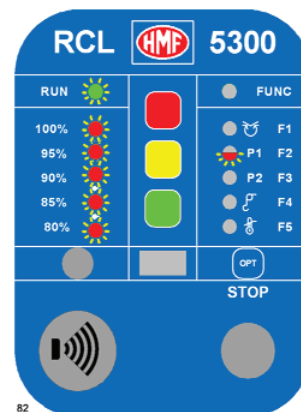
81



### 8.2 When all the control valve's levers are back in neutral position again:

- All red diodes 80% through 100% are constantly lit.
- The TCL is deactivated
- The buzzer gives a periodic signal.
- The P1 diode flashes.

The dump valve closes to tank, and it will be possible to operate load moment reducing movements.



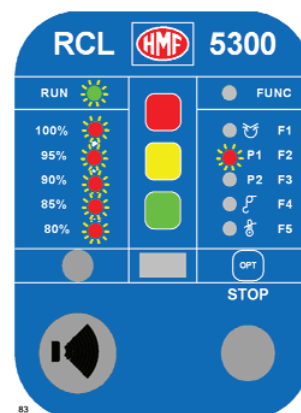
82

### 8.3 Erroneous operation after deactivation of the TCL:

In a situation (after TCL-stop), where a load moment increasing function is operated unintentionally, the controller indicates as follows:

- All red diodes 80% through 100% are constantly lit (TCL is activated again).
- The buzzer gives a constant signal
- The P1 diode is constantly lit.
- The display indicates **T.c.l.**

The dump valve opens to tank again until the control lever is in neutral position. (Levers for control valve functions which have a spool sensor, or if radio remote control is included in the operating system).



83





## 9. The override function

If the loader is “stuck” in an overload situation, where, for different reasons, it is not possible to make load moment reducing movements, it is possible to override (bypass) the safety system by holding down the red press button and at the same time operate the loader to get it out of the overload situation.

While holding down the red press button (the buzzer gives a periodic signal), the loader can be operated for 5 seconds, to get the load out of the locked situation, if possible.

If it is not possible to move the load into a sufficiently favourable position within these 5 seconds, it will be possible – with an interval of 30 seconds – to operate the loader again during 5 seconds.

The 30 seconds non-operational time is only reset after 5 seconds override. I.e. if only 3 seconds are used during the first override period, the controller remembers that the second time, the system is only able to override during 2 seconds.

After turning on the controller, it takes 30 seconds before the override function can be used.

The override function is only active in connection with overloading.  
It does not work in case of a system error.

### **Please note!**

Abusing the override function is not permitted, as this may lead to very dangerous situations such as for instance instability of the vehicle or overloading of the loader.

Furthermore, in case of abusing the override function, the SLM Safety System will cause a very long dump period (a long non-operational time before the loader can be operated again).

### 9.1 The main boom locked in vertical position

If the main boom is raised into vertical position, the safety system is activated irrespective of the loader's load moment. The main boom is locked and cannot be lowered for a certain period.

To get out of this situation, it is possible to use the override function:

- Activate the control lever for the “Boom – down” movement, and push the red press button.

If it is not possible to lower the main boom within 5 seconds, repeat the override function.



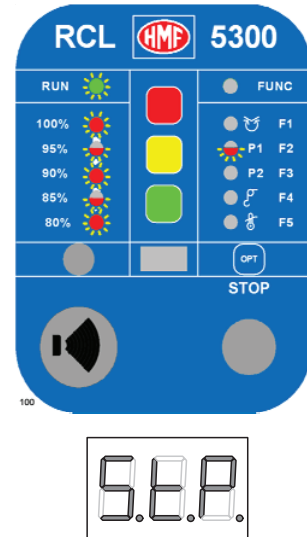


## 10. Absolute stop in case of override

If the loader has been significantly overloaded as a consequence of using the override function, the safety system will go into an absolute stop, and the loader can no longer be operated.

### Indication of absolute stop in case of override:

- The P1 diode (loader) or P2 diode (Fly-Jib) is flashing.
- The diodes 80% through 100% are constantly lit.
- The display indicates flashing **S.t.P.** (loader stop)
- The buzzer gives a constant signal



To get out of this situation, the only possibility is emergency operation of the loader. Please see the relevant chapter.

### Please note!

In case of significant overloading of the loader or in case of certain types of error from the pressure transducer (or a short circuit of the signal wire) the safety system can also go into an absolute stop.

## 11. Emergency operation of the loader

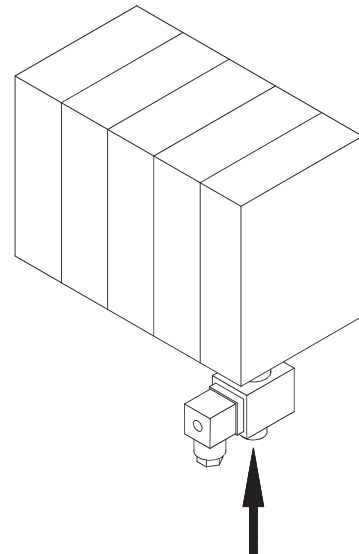
If, during loader operation, a situation occurs where for example the electric connection between the power supply (the battery of the vehicle) and the safety system fails, a manual override push button on the dump valve can be pressed at the same time as the control valve is being operated.

Please note that before pressing the override push button, the seal has to be broken.

This is how emergency operation is made possible, and the loader can be moved out of a dangerous position, if necessary, and then be folded so that the vehicle can drive away.

### Please note!

Abusing this safety detail is not permitted, it must only be used for emergency operation. In case of using the manual override function, the button must be sealed again (at an authorised IMT Service Center).





## 11. Stop button

If a dangerous situation occurs during loader operation, release the control lever and push the stop button into locked position.

The power supply to the loader is thus interrupted, i.e. the dump valve opens and the oil is led to tank.

After pushing the stop button it is indicated as follows:

- **RUN** is flashing
- The display shows 001

### Starting up after using the stop function.

**Please note:** If the stop button has been pushed because of an emergency situation, do not pull it out again before the reason for the emergency situation has been found and remedied.

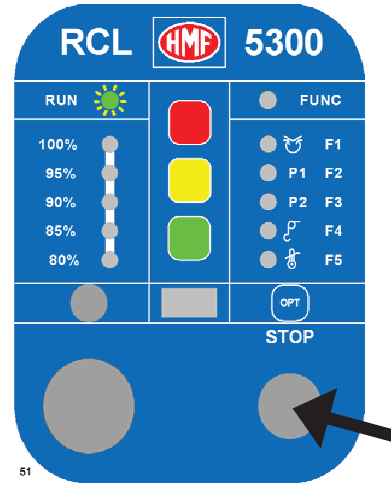
After the stop button has been pulled out, it is indicated as follows:

- **RUN** is constantly lit
- The display indicates running lights as in case of normal loader operation.

The safety system and the loader is now ready for operation.

**Please note:** Test the stop button function each time the loader is started up. Activate a loader function and when pushing the stop button, the loader movement must stop.

**Please note:** It must not be possible to activate any loader function while the stop button is in locked position. Otherwise, please contact an authorized IMT Service Center.



## 13 Disconnection of buzzer

In cases where loader operation takes place in the load moment area exceeding 90%, the buzzer gives a periodic signal.

The periodic signal from the buzzer during some time may seem very disturbing, and therefore it is possible to reduce the sound level or completely disconnect it.

After the sounding of the buzzer for 5 seconds, it can be disconnected by pushing the **green press button**:

- The first push reduces the sound level
- The next push reduces the sound level further
- The third push interrupts the buzzer

If the load moment of the loader gets below 90%, the buzzer will automatically go out of disconnection mode again. I.e. if the load moment exceeds 90%, the buzzer will start giving a periodic signal again.



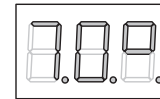
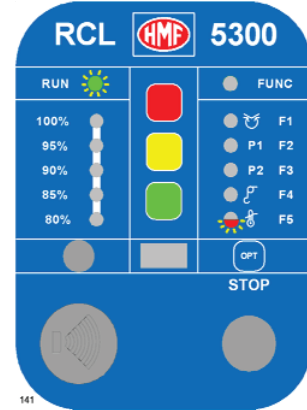
## 14. Oil temperature monitoring

If the loader is fitted with an oil cooler or a separate temperature sensor, the temperature of the hydraulic oil is being checked.

### 14.1 Warning at high oil temperature

If the operation temperature of the hydraulic oil becomes high, the controller indicates as follows:

- The oil temperature diode (F5) flashes.
- The current temperature between 70 and 79°C is flashing in the display.



### 14.2 Stop of loader in case of critically high oil temperature

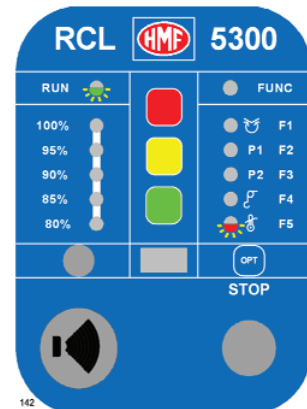
If the oil temperature increases further to 80°C, the safety system interferes and stops the loader before the oil is superheated thus damaging the hydraulic system.

In case of loader stop the following is indicated:

- The oil temperature diode (F5) is lit.
- The current temperature between 80 and 99°C is constantly lit in the display.
- The buzzer gives a constant signal

The dump valve opens to tank and the loader stops.

The loader is stopped, but emergency operation of the loader can take place at the same time as **the red press button is kept down**. It is thus possible to move the loader into stowing position after a stop in a working situation.



Loader operation cannot be started again until the oil has been sufficiently cooled:

- A temperature of 79°C or less is flashing in the display.
- The oil temperature diode (F5) flashes (or turns off).



## 15. 2-stage Load Moment Limitation (LMB)

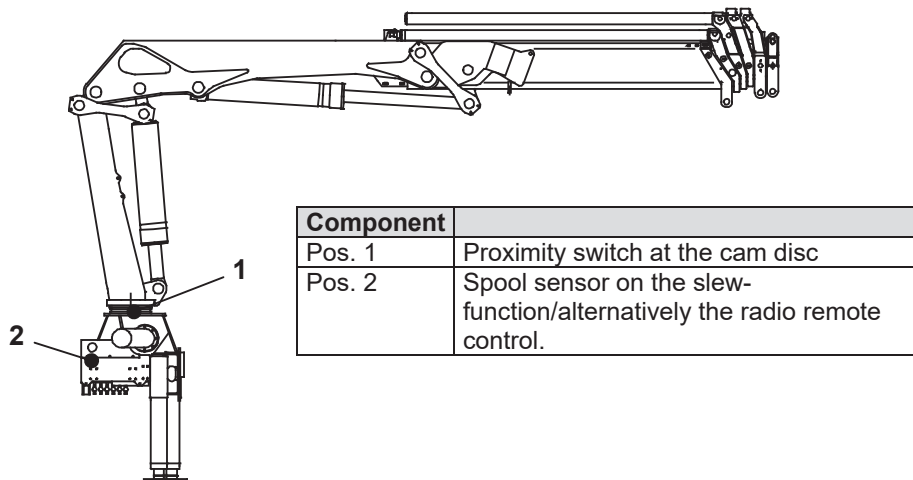
### 15.1 The safety system

If the vehicle is not stable in the entire slewing area of the loader (e.g. in front of the driver's cab), the RCL 5300 Safety System is extended by a 2-stage load moment limitation system (LMB).

The 2-stage LMB ensures that the lifting capacity of the loader is reduced in the slewing area where the vehicle is unstable.

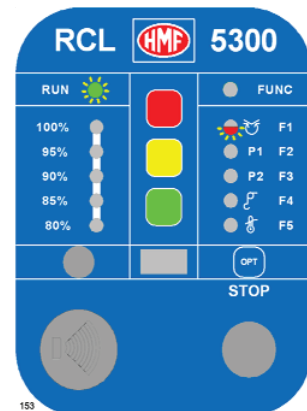
### 15.2 Configuration of the 2-stage LMB

Apart from the standard safety system, the following components are included:



### 15.3 Working in the stable slewing area

- If working with a load moment lower than the capacity in the unstable area, no indication will occur on the controller.
- If working with a load moment higher than the capacity in the unstable area, the controller will indicate as follows: the diode with the slewing limitation symbol (F1) flashes and warns the operator of the slewing movement being stopped, if this movement gets into the unstable area.



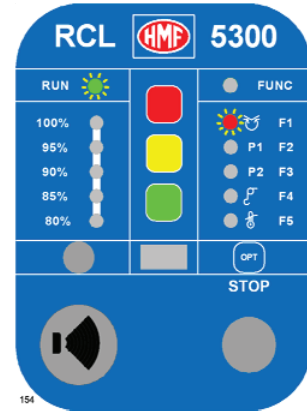


## 15.4 Slewing with a too large load moment towards the unstable slewing area

If, (despite the warning) the slewing movement has a too large load moment from the stable to the unstable area, the slewing movement will be stopped and the controller indicates as follows:

- The diode with the slewing limitation symbol (F1) is constantly lit.
- The buzzer gives a constant signal
- The display indicates illuminated **2.S.t.**
- The dump valve opens to tank (the slewing movement is stopped).

To be able to move into the unstable slewing area, the load moment should now be reduced to the capacity in this area.



## 15.5 Working in the unstable slewing area

If working with the loader in the unstable slewing area, the monitoring of the load moment functions exactly as in the stable area, but the max. permissible load moment is reduced.

I.e. the diode/buzzer indications function as normal but at a lower level (indication with the 100% diode means that the load moment is at the max. permissible limit corresponding to the capacity in the unstable area).



## 16. EVS - Electronic Vehicle Stability

### 16.1 The EVS System

As described in the beginning of this instruction manual, the main purpose of the RCL 5300 Safety System is to ensure that the loader's max. permissible load moment is not exceeded.

The EVS (Electronic Vehicle Stability) is a load dependent system, which is monitoring and securing the vehicle stability during loader operation in the critical working areas.

The EVS System is integrated in the RCL 5301 controller.

Generally the loader's max. load moment cannot be utilized in the entire working area, due to lacking stability of the vehicle.

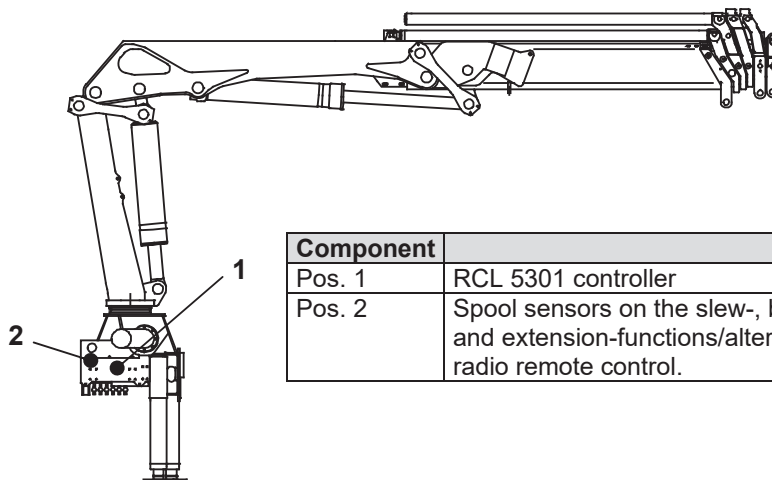
If the loader is equipped with an EVS System, its lifting capacity can constantly be utilized to its max. limit in relation to the stability of the vehicle.

By loading the vehicle in the right way, i.e. placing the first burdens so that their weight increases the stability of the vehicle, it will be possible to obtain sufficient stability for utilizing a larger part of the loader's load moment.

In other words, the loader's load moment is constantly adapted up to the limit of the vehicle's stability, no matter where in the working area the lifting movement is carried out.

### 16.2 Configuration of the EVS System

The safety system is built up as a standard configuration with the following changes/supplementary components:

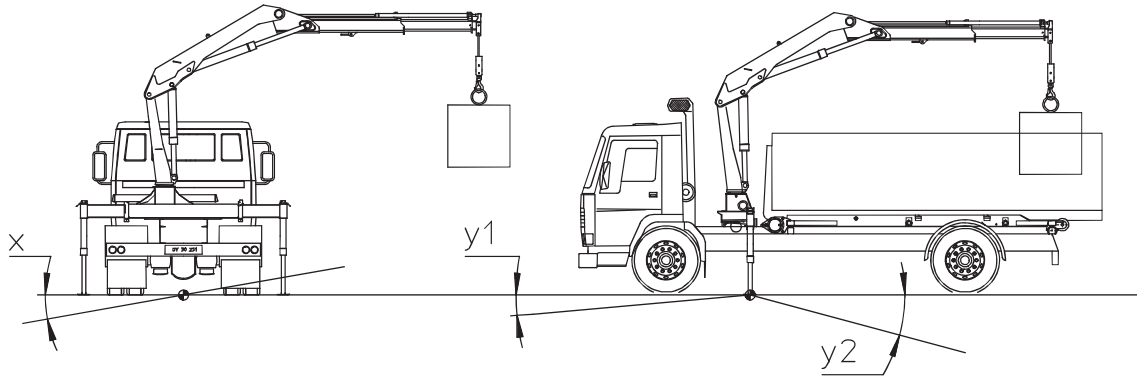


Component	
Pos. 1	RCL 5301 controller
Pos. 2	Spool sensors on the slew-, boom-, jib- and extension-functions/alternatively the radio remote control.



### 16.3 Mode of operation of the EVS System

An AIC-unit (Advanced Inclination Controller) is built into the RCL 5301 controller. The AIC-unit has two built-in heel sensors, measuring the heel of the vehicle to the left and right (X-direction), to the front (Y1-direction), and to the back (Y2-direction).



During loader operation the AIC-unit is thus constantly monitoring the heel of the vehicle. When the heel reaches a marginal value, i.e. when the vehicle starts being unstable, a signal from the AIC-unit is sent to the RCL Safety System.

In the same way as the loader's load moment increasing movements are stopped because of overloading (Load Moment Limitation – LMB), the RCL system reacts in case of too much heel and stops the stability reducing loader movements (Electronic Vehicle Stability – EVS). Also a slewing movement registered as a stability reducing movement will be stopped. All stability increasing loader movements can still be operated.

The safety system will interfere in the following sequence:

- The heel reaches the marginal value
- The marginal value of the heel is registered by the AIC-unit
- The AIC-unit sends a signal to the RCL controller
- The EVS-system stops the stability reducing loader movements



## 16.4 Load Moment Limitation (LMB) and Electronic Vehicle Stability (EVS)

Load moment limitation (LMB) and Electronic Vehicle Stability (EVS) is an integrated safety system controlled by the RCL controller.

If the loader is equipped with an EVS-system, two types of interfering can be experienced during loader operation, if a critical situation occurs:

1. The load moment of the loader is at the *max. permissible limit* and the LMB is activated or
2. The loader has stressed the vehicle to the *max. permissible heel limit* and the EVS is activated.

No matter which of the two systems are activated, the load moment increasing or stability reducing movements are stopped (the dump valve opens so that the oil from the pump flows to tank).

Load moment reducing or stability increasing functions can be operated freely (the dump valve closes so that the oil from the pump can flow to the loader cylinders).

## 16.5 Calibration of the EVS-System

The ground is not always completely horizontal where loader operation takes place. Also, the vehicle is not in horizontal position and has thus a so-called *initial heel*.

The AIC-unit registers the heel of the vehicle during loader operation. The loader's load moment can make the vehicle heel up to a max. marginal value called the *heel margin*.

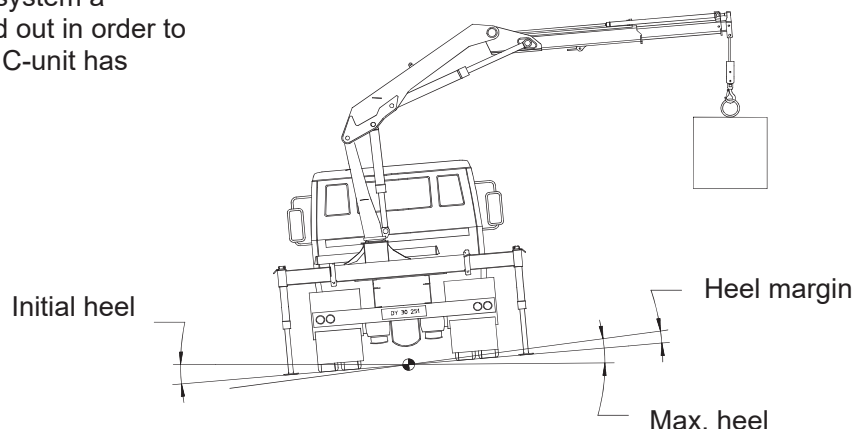
The total heel, i.e. the *initial heel* plus the *heel margin* must not exceed a marginal value called the *max. heel*.

### Please note!

The *max. heel* is pre-set at 5 degrees (depending on the vehicle). I.e., if the vehicle heels a lot so that the *max. heel* exceeds 5 degrees, the RCL system and thereby the loader cannot be activated.

In any case of starting up loader operation, the vehicle will as a starting point heel a little bit and thus have an *initial heel*, which is registered by the AIC-unit.

When starting up the RCL system a *calibration* has to be carried out in order to reset the heel, which the AIC-unit has registered.







### 16.5.1 Calibration when starting up

When starting up loader operation, after having extended the stabilizer beams and lowered the stabilizer legs, the vehicle is not in horizontal position but has an *initial heel*. To ensure that the EVS system can function correctly, the initial heel has to be reset, i.e. the current registered angle of heel is set at zero degrees.

When starting up the RCL-system, the AIC-unit registers the initial heel of the vehicle. Provided that the load moment of the loader is less than approx. 25% (depending on the design of the loader and the loader equipment), the system carries out an automatic *calibration*, i.e. zeroizing of the initial heel.

When the system has been calibrated, the buzzer confirms by 3 beeps.

During loader operation to both sides of the vehicle, it will be an advantage if the EVS system calibrates at as low a load moment as possible. The best possible calibration is obtained when the loader is folded in stowing position during start up. Please see chapter on “**Optimisation of calibration**”.

If the load moment exceeds approx. 25% when the RCL system is started up, the system does not carry out any calibration and the loader is derated. I.e. the loader can only be loaded up to the level where the vehicle is stable in the entire slewing area of the loader.

### 16.5.2 Automatic calibration

During loader operation, the EVS system will try to optimize the calibration. Each time the load on the loader gets below the level where it was last calibrated, a new calibration is carried out.

Each time the system is calibrated, the buzzer confirms by 3 beeps.

### 16.5.3 Calibration during loader operation

During loader operation, three situations may occur, making it necessary to carry out a new calibration of the EVS system:

1. In case of electric changing over to stabilizer operation
2. In case of major changes of the heel of the vehicle at a low load moment.
3. In case of a stabilizer leg sinking into the surface

#### Re.: item 1

If the loader has an electric reverser between the loader functions and the stabilizer functions, and the operator has operated the stabilizer (push the yellow press button twice), the system will calibrate again at the moment where a loader function is operated. Please see chapter on *Start up procedure*.

#### Re.: item 2

If the heel of the vehicle has changed to more than 50% of the max. permissible heel (heel margin), and at the same time the load on the loader remains below approx. 25%, the system will calibrate again.



#### Re.: item 3

If, during loader operation, a situation occurs where a stabilizer leg sinks a bit into the ground, the heel of the vehicle will change, and this will be registered by the EVS system as beginning instability.

In this way the loader's lifting capacity can only be utilized corresponding to the reduced stability.

If the heel of the vehicle exceeds the marginal value for instability as a consequence of a stabilizer leg sinking a bit into the surface, all loader movements are stopped for 4 seconds. After this, only stability increasing loader movements can be operated.

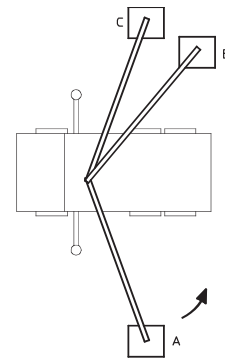
Now the load has to be moved in the direction towards the vehicle (stability increasing direction). Afterwards a new calibration is carried out.

### 16.5.4 Optimisation of calibration

If the working tasks require slewing a load from one side of the vehicle to the other, asymmetric stability might occur.

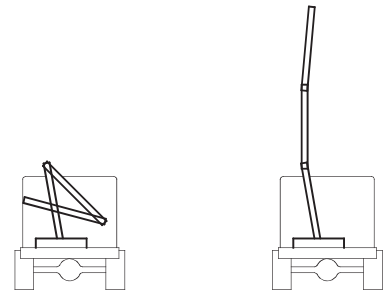
I.e., if a load is to be moved from point A to point C in the opposite side, the EVS system might be activated and the slewing movement stopped already in point B.

In such a working situation it is necessary to optimise the calibration, i.e. the EVS system calibrates at as low a load moment as possible.



Optimal calibration at a low load moment on the loader is carried out as follows:

- When the loader is folded in stowing position
- When the boom system is raised into vertical position



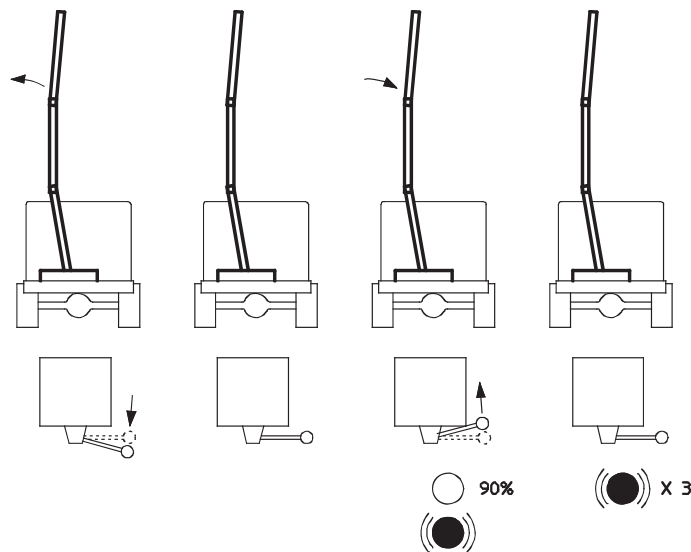
The 80, 85, 90, 95, and 100% diodes on the RCL indicator panel indicate, right before the calibration is carried out, the size of the current load moment on the loader:

- The 80% diode indicates the worst calibration (at the highest load moment)
- The 100% diode indicates the best calibration (at the lowest load moment)



Example of optimisation of calibration:

- There is no load on the hook
- Raise the boom into vertical position to a position where the load moment is estimated to be low. Put the control levers in neutral position.
- If the load moment in this position is lower than at the previous calibration, a diode indicates the current load moment at the moment when you operate a loader movement again (e.g. "boom down").
- E.g. if the 90% diode is lit and the buzzer gives a constant signal for as long as the lever is kept in this position. The loader does not move. A constant signal from the buzzer indicates that the dump valve opens and the oil flows to tank.
- The new, improved calibration is being carried out at the moment when the levers of the valve block are back in neutral position.
- When the calibration has been carried out, the buzzer confirms by 3 beeps.
- Then loader operation can start.



If you want to improve the calibration further, repeat the procedure by moving the boom system close to vertical position. With this boom position the load moment of the loader is low and the best possible calibration can be obtained. This is indicated by the 100% diode being lit.

Please note:

The main boom must not be completely raised and extended to its extreme position. In this case the hydraulic system will build up a high pressure, which is registered as a high load moment by the RCL/EVS system. Therefore the EVS system will not carry out any calibration.



### 16.5.5 Manual calibration

During loader operation it is possible to carry out *manual calibration*. E.g. if you want an optimisation of the calibration. Please see previous chapter.

Provided that the load moment of the loader is less than approx. 25%, a *manual calibration* can be carried out when pushing first the yellow and then the green press button on the RCL indicator panel.

Now one of the 80, 85, 90, 95, or 100% diodes on the RCL indicator panel indicate the size of the current load moment on the loader.

Please see chapter on "Optimisation of calibration".

At the first activation of one of the levers of the valve block, the buzzer gives a constant signal, indicating that the dump valve opens and the oil flows to tank. The loader does not move.

When the lever is moved into neutral position, the system calibrates, and the buzzer confirms by 3 beeps. During 5 seconds one of the %-diodes indicates how optimal the calibration was that has just been carried through (100% is the best possible calibration).

Then loader operation can start.

## 16.6 Starting up of the loader

Before starting up, the essential safety regulations have to be respected, just as the general procedure in connection with starting up of the loader has to be followed. Please see the *Instruction Manual* of the loader.

Especially during the *Start up procedure* it is important that the vehicle is stabilized correctly, when the stabilizer legs are lowered to the ground.

This is to ensure that the loader can lift the max. permissible load without the vehicle's heel reaching the marginal value where the EVS-system is activated.

### 16.6.1 Start up procedure

Before starting up, the operator must carry out the following:

- If the vehicle is air-sprung, the air bellows have to be bled.
- Connect the pump (PTO); the controller is thus powered.
- Push the green press button on the RCL indicator panel.
- The RUN diode is now constantly lit and the RCL Safety System is activated.
- Push the yellow press button twice to select the stabilizer function.
- Extend the stabilizer beams and lower the stabilizer legs (with steel plates under the footplates, if necessary) until the chassis of the vehicle is lifted approx. 5 cm.
- Activate one of the levers of the valve block to unfold the loader from its stowing position.



The loader does not move.

While the control levers are being activated, it is indicated that the EVS system is waiting for a calibration:

- A diode (e.g. the 85% diode) is constantly lit
- The buzzer gives a constant signal
- The display indicates **C.A.L.**



- Move the levers of the control valve into neutral position, after which the EVS system is calibrating.
  - When the calibration has been carried out, the buzzer confirms by 3 beeps.
  - Then loader operation can start.
- \* The diode states to which level the EVS system is being calibrated. Please see chapter on "Optimisation of calibration".

## 16.7 Signalling during loader operation

The different indications will state whether it is the load moment limitation (LMB) or the heel of the vehicle (EVS) that causes the interference from the RCL safety system.

Indications in relation to the heel of the vehicle (EVS) are described in the following.

### 16.7.1 Indication at heel

The red diodes indicate the heel of the vehicle in percentage between 80% and 100% of the max. permissible heel.

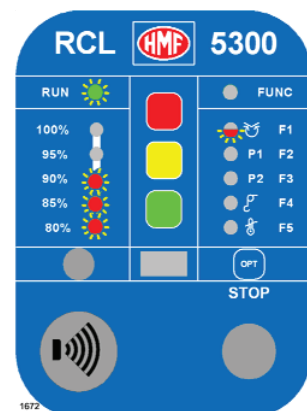
When the heel is between 80% and 100 %, the red diode with the slewing symbol (F1) also flashes.

### 16.7.2 Indication at a 90% heel

At a 90% heel, the following is indicated:

- The 80%, 85% and 90% diodes are constantly lit.
- The buzzer gives a periodic signal.
- The red F1 diode continues to flash (between 80% and 100%).

The signalling described continues till the load moment gets below 90% again.



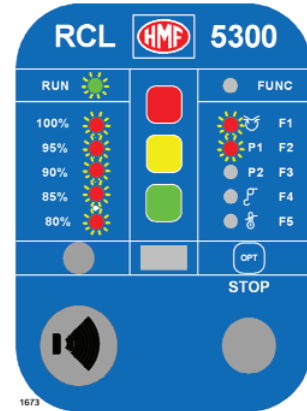


### 16.7.3 Indication at the max. permissible heel

Example:

If, during loader operation a heavy burden is moved from the truck body and over the side, the heel of the vehicle will increase. If the heel exceeds the marginal value (heel margin), where the vehicle becomes unstable, the following is indicated:

- The 80% through 100% diodes are constantly lit.
- The slewing symbol (F1) is constantly lit.
- The P1 diode is constantly lit (indicates that the loader's lifting capacity is reduced).
- The buzzer gives a constant signal
- The display indicates **E.U.S.** (EVS)



The dump valve opens to tank and *all loader movements are stopped* (EVS stop).

Indication of a load moment of 100% means that the lifting capacity of the loader has been reduced (derated) to the lifting capacity of the loader at the moment when the loader was stopped.

Any other kind of loader function, which in the same way makes the heel of the vehicle exceed the marginal value for instability, entails the same loader stop as in the above example.

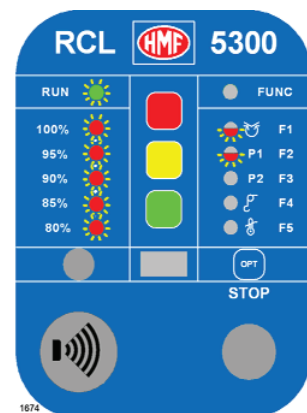
By stopping the loader, the EVS-system warns the operator of beginning instability of the vehicle and that stability increasing loader movements have to be operated.

### 16.7.4 Indication after the EVS stop

When all the control levers are back in neutral position again and the load is stable, the following is indicated:

- The 80% through 100% diodes are constantly lit.
- The slewing symbol (F1) is flashing.
- The P1 diode flashes (indicates that the loader's lifting capacity continues to be reduced).
- The buzzer gives a periodic signal.

The dump valve closes to tank, and after all the control levers having been in neutral position, it is possible to operate the loader again. The load has to be moved in the direction towards the vehicle (stability increasing movements).



#### Please note!

In case of loader stop in certain positions, it might be necessary to operate stability increasing movements by for instance the "extension retract" movement up to one metre or more, before the EVS system is deactivated, thus allowing normal lifting capacity. This is due to the chassis' inertia to "draw itself up" after heeling (hysteresis).



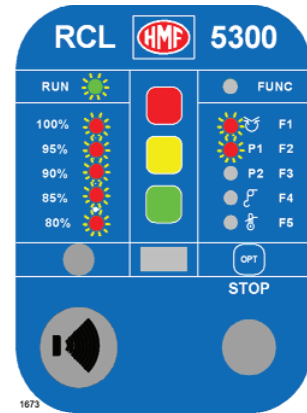
### 16.7.5 Erroneous operation after an EVS stop

If, after an EVS stop, the operator accidentally operates a loader function, which gives a stability reducing loader movement, the following is indicated:

- The 80 through 100% diodes are constantly lit.
- The slewing symbol (F1) is constantly lit.
- The P1 diode is constantly lit (indicates that the loader's lifting capacity is reduced).
- The buzzer gives a constant signal
- The display indicates **E.U.S.** (EVS)

The dump valve opens to tank and *all loader movements are stopped* (EVS stop).

The EVS-system intervenes against the erroneous operation (EVS stop). After all the control levers having been in neutral position, it is possible to operate the loader again. The load has to be moved in the direction towards the vehicle (stability increasing movements).



### 16.7.6 SIM-stop at a heel exceeding the marginal value

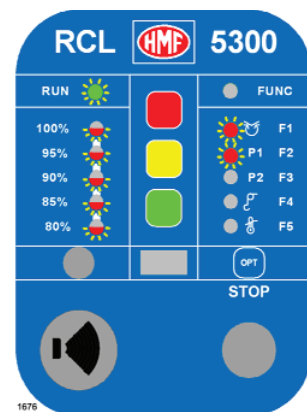
If a stabilizer leg sinks into the ground or if the spring suspension system of the vehicle is dynamic and increases the heel after an EVS stop, the heel is going to exceed the marginal value considerably.

All loader movements are stopped and the following is indicated:

- The 80% through 100% diodes are flashing.
- The slewing symbol (F1) is constantly lit.
- The P1 diode is constantly lit (indicates that the loader's lifting capacity is reduced).
- The buzzer gives a constant signal
- The display indicates **E.U.S.** (EVS)

After all the control levers having been in neutral position, it is possible to operate the loader again. The load has to be moved in the direction towards the vehicle (stability increasing movements).

In case of the vehicle heeling a lot, it may be necessary to use the override function by pushing the red press button, while operating stability increasing movements.





## **16.8 Especially for loaders equipped with HDL**

When a loader is working in HDL-mode the working speed is reduced to approx. 20% of the loader's normal speed.

This principle is utilized in connection with the EVS-system.

When the heel of the vehicle is 70% of the max. permissible limit (the heel margin), the HDL is activated, and the working speed of the loader reduced. If the loader is equipped with proportional HDL, the working speed is reduced proportionally to the heel.

This function indicates that there will soon be an EVS stop. Furthermore this is to ensure a "soft stop" thanks to the reduced speed, which is an advantage, in particular in case of a slewing movement.

Please see chapter on HDL.

## **16.9 Override and EVS**

If the loader is "stuck" in a position, where it is not possible to make stability increasing movements, the EVS-system can be bypassed (overridden) when pushing the red press button on the RCL indicator panel.

In case of e.g. a very fast slewing movement with a heavy load, the loader is stopped because the EVS-system is activated (EVS stop) – this overload (large heel) might entail that it is not possible to make a slewing movement back into a stability increasing direction.

In this situation it is possible to hold down the red press button and the loader can thus be operated for 5 seconds in a stability increasing direction.

Please also see description of *The override function* previously in this manual.

### **Please note!**

Consider thoroughly the next movement/s and operate the loader carefully, when the override function is used.

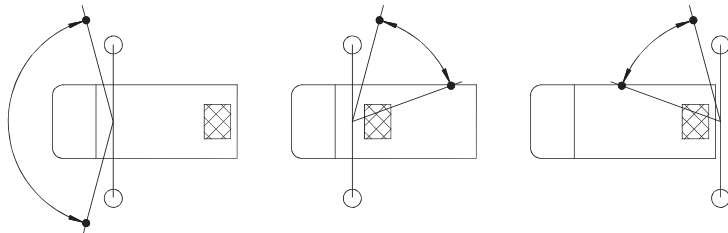
Be careful not to operate a stability reducing function by mistake when using the override function.





## 16.10 Good advice for unproblematic operation of the loader

- Always fully extend stabilizer beams to max. stabilizer spread in order to obtain max. stability of the vehicle.
- Make certain that the ground is sufficiently firm and that there is no risk of a stabilizer leg being able to break through for instance a frozen layer on the ground.
- Always use steel plates under the footplates of the stabilizer legs, when necessary.
- If a stabilizer leg sinks a bit into the ground during loader operation, the calibration becomes incorrect. To obtain max. lifting capacity, it is necessary to carry out a new calibration of the EVS system. Please see chapter on "Calibration of the EVS system".
- Always drive as close to the load to be lifted as possible.
- Make lifting movements with the main boom as close to horizontal as possible (the boom position where the loader has its max. load moment).
- Generally operate the loader movements in a calm and considerate way, in particular when getting near the critical heel of the vehicle.
- Always operate the loader slowly when moving a burden at a long reach.
- Always consider that it increases the vehicle stability if the load is placed in the right place when starting the loading work. The illustrations show the different working areas and the different loader positions as well as positioning of the load to obtain max. vehicle stability.



## 16.11 Warning

- If for example a stabilizer leg sinks into the ground, entailing the risk of the vehicle overturning:
  - Drive the load closer to the vehicle. Even though the EVS-system is activated, the "extension retract"-function can always be operated.
  - If the jib extension is retracted, and the slewing movement cannot be operated, use the override function to get out of the situation.
  - When starting up again, then follow the *Start up procedure* again.
- Abusing the override function is not permitted, as this may lead to very dangerous situations.
- Avoid inappropriate use of the loader, e.g. fast loader movements with the load at a long reach.
- Avoid oscillation of the load during loader operation, especially when the load is in a long sling, or when working with winch and a long wire rope. In case of EVS stop, the load might move outwards, which may drastically increase the load moment entailing the risk of too much heel of the vehicle.
- Operate the loader carefully when the vehicle is empty. Peak loads might occur and thereby activation of the EVS-system.
- Avoid slewing a load quickly from one side of the vehicle to the other. Loader stop might occur, due to the fact that the EVS system has not been calibrated in the best possible way. Please see chapter on "Optimisation of calibration".



## 17. Safety system, stand-up controls, HS

### 17.1 The safety system

If the loader is fitted with stand-up controls (HS), the RCL Safety System is enhanced with one of the following systems dependent on the country to which the loader is to be delivered:

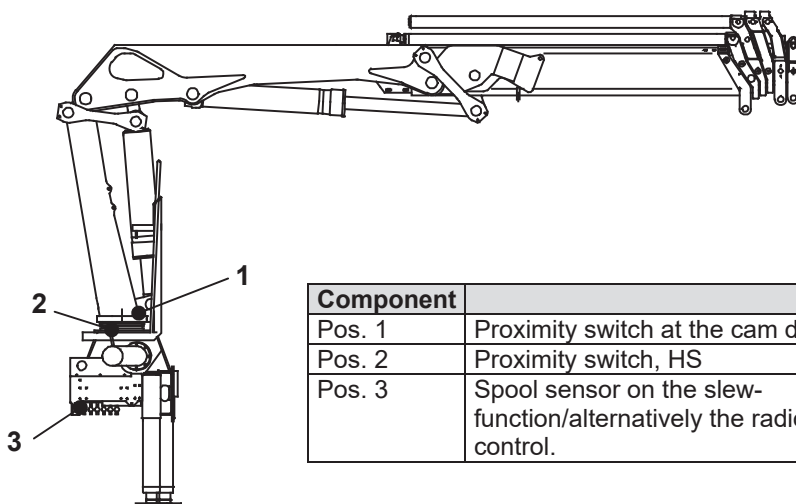
- **Slewing stop, stand-up controls**
- **Warning during slewing movement over stand-up controls**

The safety system must protect the operator against being pinned by the boom, when the loader is operated from the stand-up platform.

If the operator stands on the ground operating the loader, this safety system is not activated, and the slewing movement can be operated freely, provided that the vehicle is stable (please see chapter on 2-stage load moment limitation (LMB)).

### 17.2 Configuration of the safety system for stand-up controls

Apart from the standard safety system, the following components are included:



Component	
Pos. 1	Proximity switch at the cam disc
Pos. 2	Proximity switch, HS
Pos. 3	Spool sensor on the slew-function/alternatively the radio remote control.



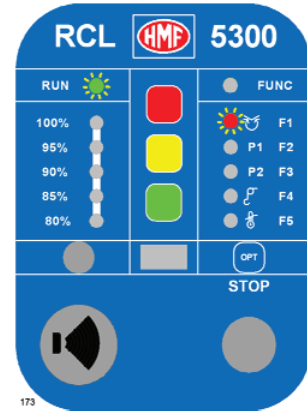
### 17.3 Slewing limitation, stand-up controls

If the operator is standing on the stand-up platform and the slewing movement is to the right, the slewing movement will be stopped before the boom moves over the stand-up platform. The slewing movement cannot be moved over the operator.

The controller indicates as follows:

- The diode with the slewing limitation symbol (F1) is constantly lit.
- The buzzer gives a constant signal
- The display indicates **H.S.**

The dump valve opens to tank and the slewing movement is stopped.



### 17.4 Warning during slewing movement over stand-up controls

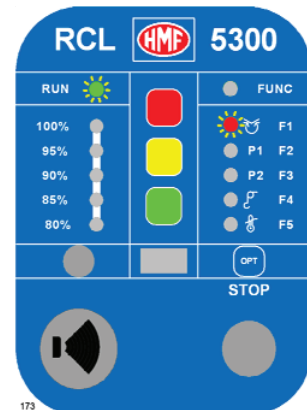
If the operator is standing on the stand-up platform and the slewing movement is to the right, the buzzer will give a periodic signal before and while the boom moves over the stand-up platform. The slewing movement is not being stopped.

If the operator tries to use the “boom down”-function in the area over the platform, the controller indicates as follows:

- The diode with the slewing symbol (F1) is constantly lit.
- The buzzer gives a constant signal
- The display indicates **H.S.**

The dump valve opens to tank and the slewing movement is stopped.

This is to prevent that the operator accidentally lowers the boom over himself.



### 17.5 Combination of 2-Stage LMB and safety system for stand-up controls

Sensors and other equipment are the same as used in connection with **Safety system, stand-up controls**.

Only in this case the controller has been programmed to control both safety systems.



## 18. Heavy Duty Lifting, HDL 2

### 18.1 The HDL System

The HDL System offers the possibility of increasing the nominal load when reducing the working speed at the same time.

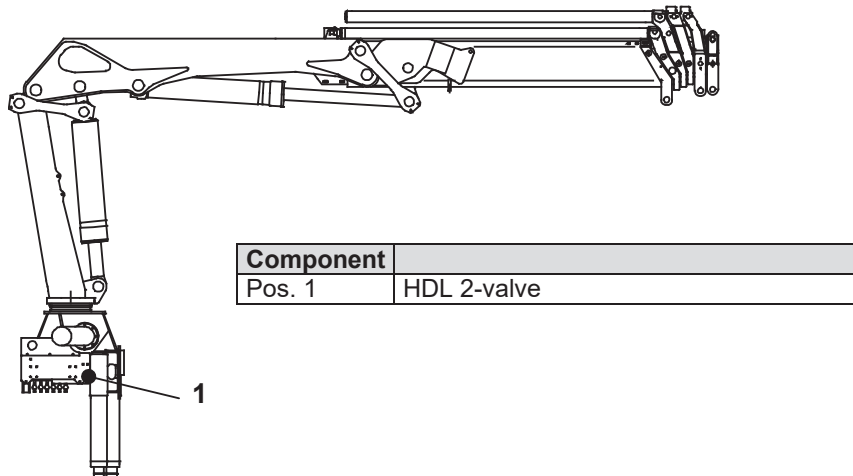
When the loader reaches its normal lifting capacity limit, the HDL System will automatically couple in, irrespective of the operator's doings, and the oil flow to the control valve will be reduced (by means of an HDL valve being operated by the controller) to approx. 20% of the normal oil flow.

This is how the loader's lifting capacity is increased by approx. 10% in the entire working area of the loader.

When the HDL System couples in, the operator will be able to continue extending the load without interruption, although at reduced speed.

### 18.2 Configuration of HDL 2

Apart from the standard safety system, an HDL 2-valve is included (pos. 1).



### 18.3 RCL 5300 SLM and the HDL System

The HDL System is semi-automatic, which means that the system is automatically activated at the normal lifting capacity limit of the loader, but by means of the red press button, the operator must manually disconnect the system again.

This disconnection implies that the load moment is below the loader's normal lifting capacity limit, and that the control lever for the "boom"-function is in neutral position.

The buzzer gives a periodic signal as usual at 90% of the max. permissible load moment (90% of the HDL lifting capacity limit).



#### **18.4 RCL 5300 TCL and the HDL System**

The HDL System is fully automatic, which means that the system is automatically activated when the load moment has been increased to the loader's normal lifting capacity limit, and it is automatically disconnected when the load moment is reduced below this limit.

However, the automatic disconnection implies that all control levers have been into neutral position at the same time as the load moment is below the loader's normal lifting capacity limit.

#### **18.5 Proportional HDL**

In connection with radio remote control of the loader, activation of the HDL System is proportional, i.e. step-less.

Example:

A heavy load is extended at max. speed at a longer out-reach by means of the "extension out"-function.

When the loader has reached 70% of its capacity limit, the HDL System is automatically activated independent of the operator's doings.

Now the speed of the "extension out" movement is reduced proportionally down to 20% of the nominal working speed.

Correspondingly, the working speed is increased proportionally to 100%, if the load is retracted to a shorter reach by means of the "extension in"-function.

The example describes how the HDL System works in connection with the extension-function. The proportional HDL-activation functions in the same way in connection with all other loader functions, which increase or reduce the load moment of the loader.

If the loader is equipped with EVS, the working speed is reduced proportionally at a heel of the vehicle from 70% and up to the max. permissible heel.

When the HDL-system is activated, this is indicated on the RCL indicator panel by the FUNC diode flashing.



## 18.6 Micro operation

If, for instance the loader is to carry out positioning tasks, it will be possible to **reduce the working speed of the loader** by means of the HDL System.

Irrespective of the loader's load moment, the working speed of the loader can be reduced to approx. 20% by pushing **the red press button**.

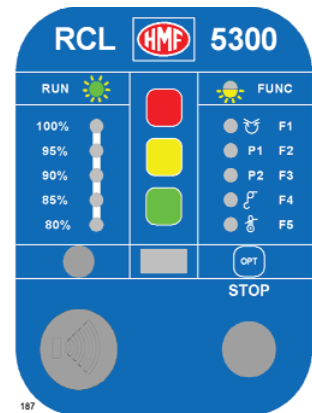
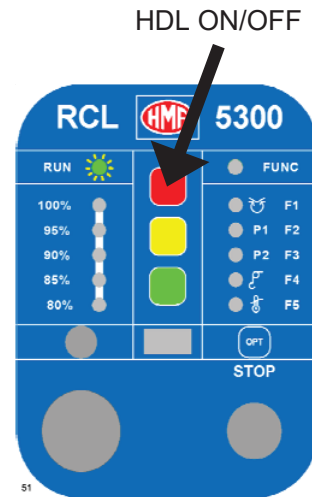
When pushing the red press button, the buzzer confirms by a short signal and the FUNC diode is flashing.

When **normal speed** is required **again**, push the red press button again. Again the buzzer confirms by a short signal.

However, operating with normal speed again implies that all control levers have been into neutral position at the same time as the load moment is below the loader's normal lifting capacity limit.

## 18.7 HDL indication

When the HDL System is activated, this is indicated on the RCL indicator panel by the FUNC diode flashing.



## 19. The RCL 5300 TCL Safety System for Fly-Jib

### 19.1 The safety system

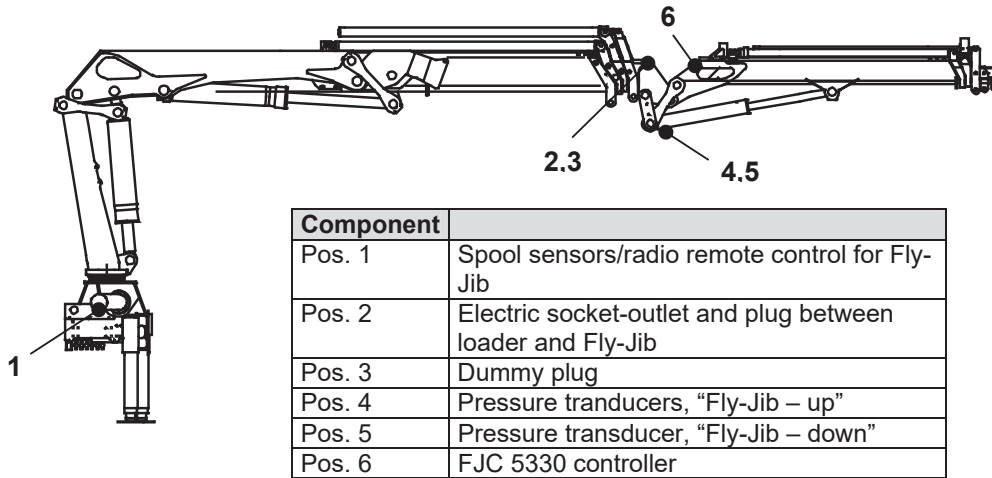
On larger IMT loader models, a Fly-Jib can be fitted at the end of the jib extensions. The Fly-Jib makes loader operation flexible, but at the same time, it entails many situations where there is a risk of overloading either the loader or the Fly-Jib.

When connecting the Fly-Jib sensors to the RCL 5300 controller, the safety system is monitoring both the loader's and the Fly-Jib's conditions as regards load moment, operation and function.



## 19.2 Configuration, Fly-Jib

Apart from the standard safety system, the following components are included:

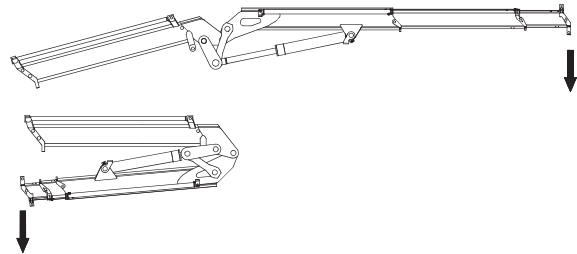


## 19.3 Mode of operation of the safety system

The basic principle of the RCL 5300 TCL Safety System is to secure both the loader and the Fly-Jib against overloading and the consequences of this. I.e. independent of the operator's doings, the system prevents the max. permissible load moment of both the loader and the Fly-Jib from being exceeded. (Load moment limitation – LMB).

The RCL 5300 controller monitors the pressure transducers mounted on the Fly-Jib boom cylinder. The pressure transducers register the hydraulic pressure, which is an indication of the load moment on the Fly-Jib.

The Fly-Jib can either have a positive load moment (at an angle moving away from the jib) or a negative load moment (at an angle moving under the jib).



The RCL 5300 registers according to the signal from one of the two pressure transducers, in which of the two positions the Fly-Jib has reached its max. load moment.

No matter which position the Fly-Jib has in relation to the jib, the controller will at any time give a signal to the hydraulic system of stopping the load moment increasing movements.

The control levers can be operated by activating load moment increasing Fly-Jib functions, but building up of a hydraulic pressure in the system is not possible (the dump valve opens so that the oil from the pump flows to tank).

Load moment reducing Fly-Jib functions as well as the slewing movement can be operated freely (the dump valve closes so that the oil from the pump can flow to the Fly-Jib cylinders).



#### 19.4 Loader operation with and without Fly-Jib

The Fly-Jib can be removed and re-fitted on the loader when required. Therefore, a box with a plug is fitted at the end of the jib extensions, so that it will be possible to disconnect the electric connection to the sensors.

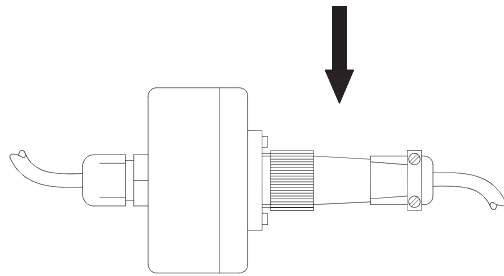
#### 19.5 Loader operation with Fly-Jib

When the Fly-Jib is mounted on the loader, the electric plug must always be fitted. When the plug is fitted this is also a signal to the RCL 5300 controller for activating the safety system so that it also includes the Fly-Jib.

#### 19.6 Loader operation without Fly-Jib

When working with the loader without the Fly-Jib being fitted, there must be a *dummy plug* fitted in the box at the end of the jib extensions instead of the electric plug from the Fly-Jib.

When the *dummy plug* is fitted this is also a signal to the RCL 5300 controller of the Fly-Jib not being fitted and that the safety system must be activated so that it only includes the loader.



#### 19.7 Monitoring of the socket-outlet and plug

The RCL 5300 controller monitors the use of the electric plug from the Fly-Jib or the dummy plug, making the operator aware of any incorrect use.

1. When working with Fly-Jib and the electric plug from the Fly-Jib is fitted in the box at the end of the jib extensions, the Fly-Jib is operated from control levers 5 and 6 and extra valves (if any) are operated from control levers 7 and 8 on the remote control box.
2. If the Fly-Jib is removed, the *dummy plug* must be fitted. The system registers when working with the extra valve functions on the loader (e.g. grab and rotator). These functions are operated from control levers 7 and 8.
3. When working with the loader with Fly-Jib at the same time as the dummy plug is fitted by mistake, the Fly-Jib can only be operated from control levers 7 and 8. As the system implies working with the extra valve functions on the loader, an increased load moment – when using these two functions alone – will entail loader stop. The controller's display indicates an error code for incorrect use of the dummy plug.
4. If neither of the two plugs is fitted, the RCL 5300 controller's display indicates an error code. Please see chapter on Troubleshooting.



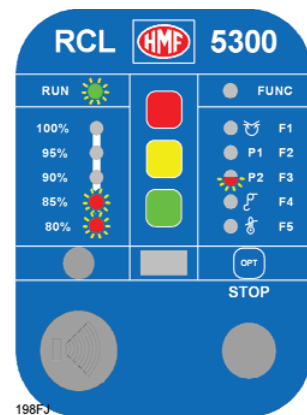
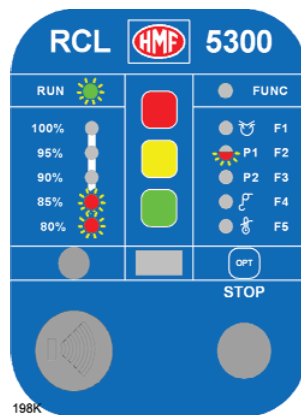


## 19.8 Signalling during loader operation with Fly-Jib

When the Fly-Jib is mounted on the loader, the controller's diodes indicate whether it is the loader or the Fly-Jib that has the largest load moment:

- At for instance a load moment of 80% (when the 80% diode is constantly lit), also the P1 or the P2 diode starts to flash.
- When the P1 diode flashes, it means that it is the *loader* that has a load moment of 80%.
- When the P2 diode flashes, it means that it is the *Fly-Jib* that has a load moment of 80%.
- The 80% through 100% diodes are constantly related to either the P1 or the P2 diode (the load moment of the loader or the Fly-Jib).

**Example:** The loader has the largest load moment (85%) The Fly-Jib has the largest load moment (85%).



Only one of the diodes, P1 or P2 is flashing at a time. It will thus be possible during loader operation to follow whether the loader or the Fly-Jib has the largest load moment. This offers the possibility of using the loader/ Fly-Jib to its maximum.

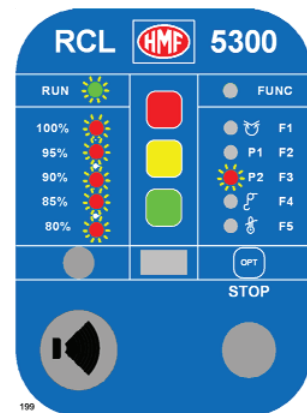
## 19.9 When the max. load moment of the Fly-Jib is 100%, the controller indicates as follows:

- All red 80% through 100% diodes are constantly lit (TCL is activated).
- The P2 diode is constantly lit.
- The buzzer gives a constant signal
- The display indicates **T.c.I.**

The dump valve opens to tank and the Fly-Jib movement causing the overload is stopped.

Please note!

The Fly-Jib has a load moment of 100% but it is still possible to increase the load moment of the loader.





## 19.10 Warning when working with loader and Fly-Jib

- The safety system prevents the loader and the Fly-Jib from being overloaded, but being the operator you are still responsible for safe operation of the loader/Fly-Jib.
- The Fly-Jib increases the loader's out-reach considerably. Therefore generally operate the loader in a calm and considerate way.
- Lower a load carefully, when working in high positions with loader and Fly-Jib. The load moment is increased suddenly and very fast, and can easily lead to serious overloading/instability.
- Always carry out a slewing movement carefully. Especially when moving a heavy load at a long reach.
- When the Fly-Jib is mounted on the loader, *the electric plug* from the Fly-Jib must also be fitted. Working with loader and Fly-Jib is not permitted while the *dummy plug* is fitted. In this case the safety system for the Fly-Jib is not activated.
- When the Fly-Jib is removed, the *dummy plug* must be fitted. Otherwise the RCL 5300 controller's display indicates an error, and the loader cannot be operated.
- Remember to push the stop button on the RCL 5300 controller before removing *the electric plug*. Otherwise the controller indicates an error, which is registered in the black box of the controller.

## 20. The RCL 5300 TCL Safety System for winch

### 20.1 The safety system

On several IMT loader models it is possible to fit a hoisting winch. The winch is mounted on the main boom or the jib, and the wire runs through a wire pulley placed in the hook suspension of the loader. At the end of the wire a swivel hook is fitted

A winch can also be used on loaders fitted with Fly-Jib.

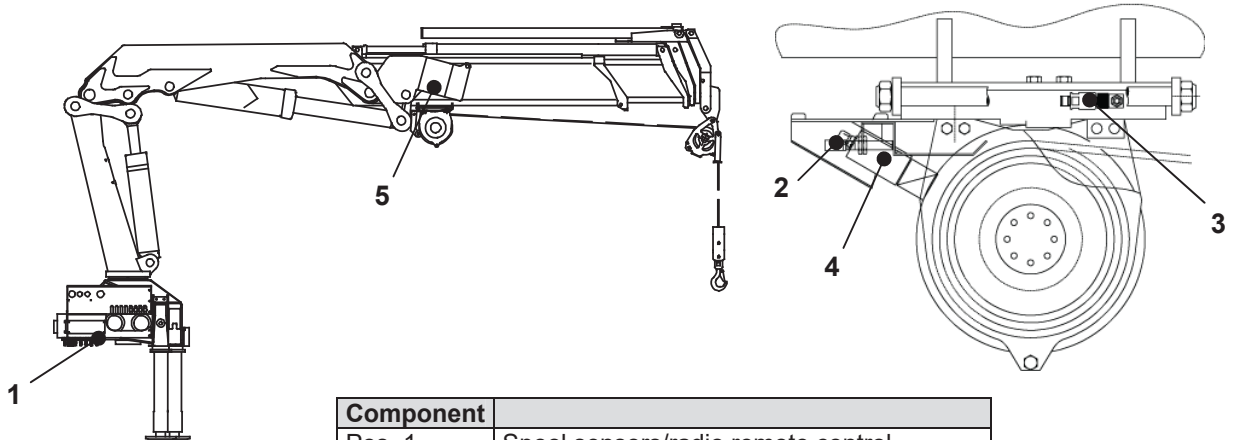
When working with loader and winch, many situations might occur, entailing the risk of overloading the loader and the winch system.

When connecting the sensors of the winch to the RCL 5300 controller, the safety system is monitoring the loader's, the Fly-Jib's, as well as the winch's conditions as regards load moment, operation and function.



## 20.2 Configuration, winch

Apart from the standard safety system, the following components are included:



Component	
Pos. 1	Spool sensors/radio remote control
Pos. 2	Proximity switch, (Winch up)
Pos. 3	Pressure transducer, winch
Pos. 4	Proximity switch, (Winch down)
Pos. 5	WIC 5333 controller

## 20.3 Mode of operation of the safety system

The basic principle of the RCL safety system is to secure both the loader and the winch system against overloading and the consequences of this. I.e. independent of the operator's doings, the safety system protects against overloading of the loader, the Fly-Jib, the winch, and the wire.

Apart from the load on the loader and the Fly-Jib, the RCL 5300 controller is monitoring the following sensors on the winch:

- A pressure transducer registering the wire pull and thereby the load on the winch. In case of overloading, all loader and winch movements increasing the wire pull are stopped.
- A proximity switch registering how many winds of wire that are left on the winch drum. When there are 3 winds of wire left on the drum, the ease movement is stopped.
- A proximity switch registering whether the wire is wound correctly on the winch drum. In case of the wire overfilling the winch drum, the hoist movement is stopped.

The control levers can be operated, even though the above-mentioned movements are stopped, but building up of a hydraulic pressure is not possible. The dump valve opens so that the oil from the pump flows to tank.

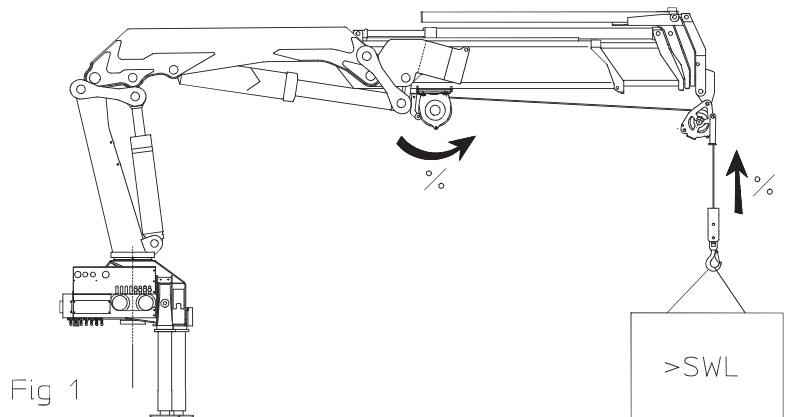
Load moment reducing movements, as well as movements in the opposite direction in relation to the movements leading to the loader stop, can be operated freely (the dump valve closes).



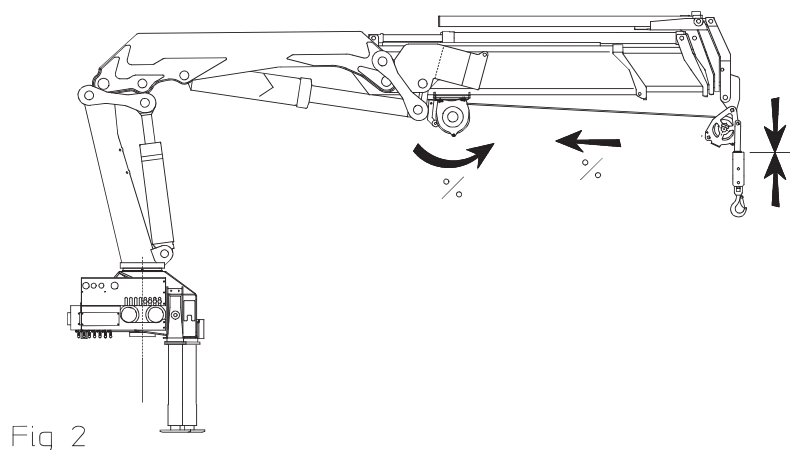
## 20.4 The functioning of the safety system

The safety system for winch protects the loader, winch, and wire against overloading in the following situations:

- In case of trying to lift a load exceeding the max. permissible wire pull, the wire is protected in the following way:
- If there are several winds of wire on the winch drum (e.g. 4 layers), a relief valve will relieve the hydraulic pressure corresponding to this max. permissible wire pull. Therefore the winch cannot lift the load.
- If there are few winds of wire on the winch drum (e.g. 1 layer), the pressure transducer gives signal to the controller that the “*winch up*” movement should be stopped.



- If the hook is hoisted up to the bracket of the hoist stop, so that the max. permissible wire pull is exceeded, the wire is protected in the following way:
- If there are several winds of wire on the winch drum (e.g. 4 layers), a relief valve will relieve the hydraulic pressure corresponding to this max. permissible wire pull. Therefore the winch cannot lift the load.
- If there are few winds of wire on the winch drum (e.g. 1 layer), the pressure transducer gives signal to the controller that the “*winch up*” movement should be stopped.





- If the hook is hoisted to the bracket of the hoist stop, and the “*extension out*” function is operated by mistake, the wire pull is increased, and at the max. permissible wire pull, the pressure transducer gives signal to the controller that the “*extension out*” function should be stopped.

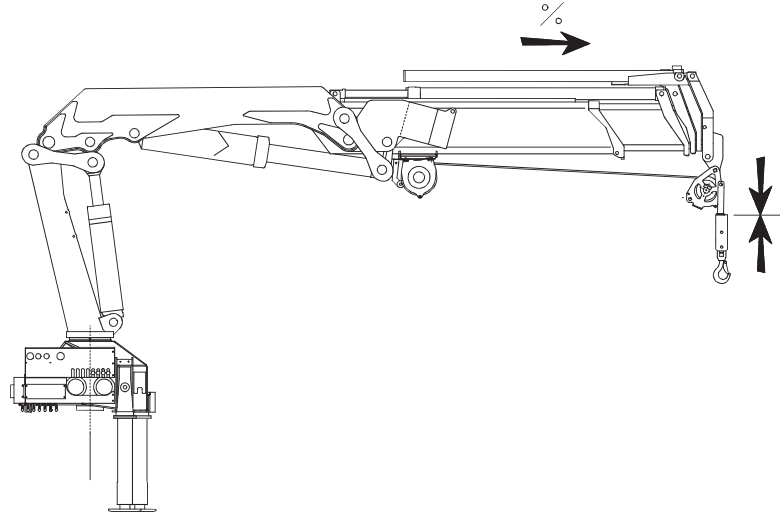


Fig 3

- In case of trying to lift a load that is heavier than the max. permissible wire pull at a short range by means of the “*boom up*” or the “*jib up*” function, the wire can easily be overloaded. In this case, the pressure transducer gives signal to the controller that the “*boom up*” and “*jib up*” movements should be stopped.

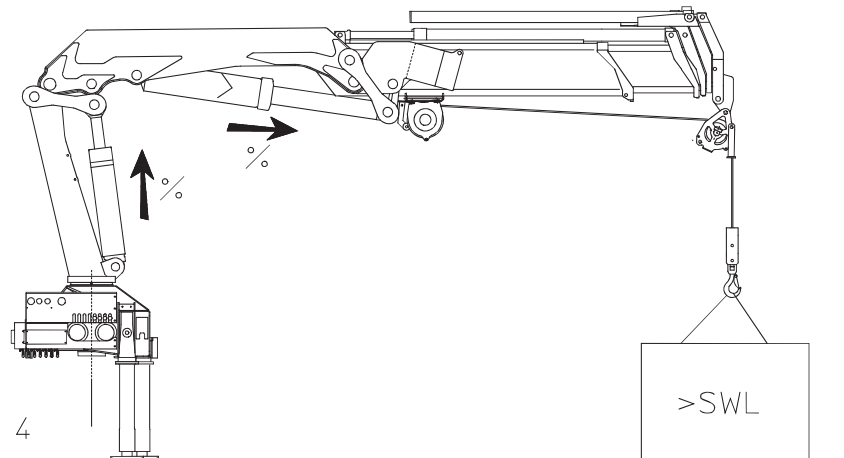


Fig 4



- If the loader is fitted with a Fly-Jib and the hook is hoisted up to the bracket of the hoist stop, and the “Fly-Jib up” function is operated by mistake, this movement may entail that the load on the wire exceeds the max. permissible limit. In this case, the pressure transducer gives signal to the controller that the “Fly-Jib up” movement should be stopped.

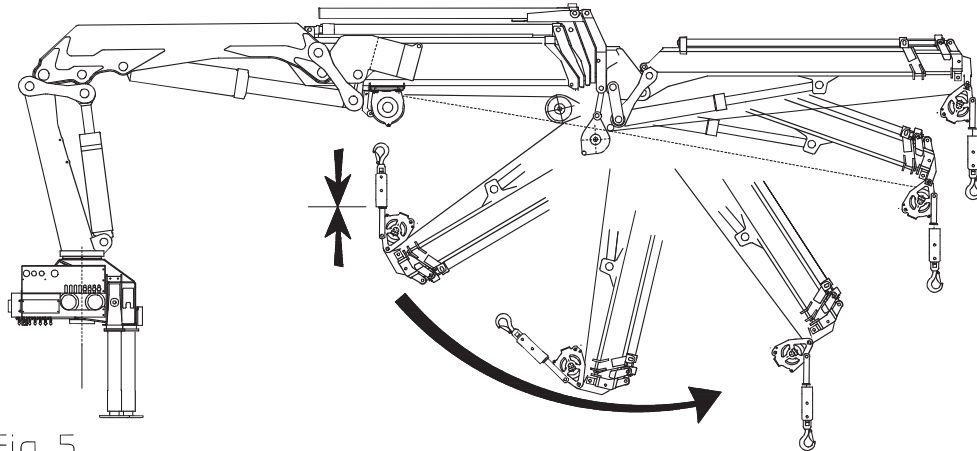


Fig 5

- If the loader is fitted with a Fly-Jib, and a load that exceeds the max. permissible limit is lifted by means of the *boom*, *jib*, *Fly-Jib* or *winch* functions, these movements may entail that the load on the wire exceeds the max. permissible limit. In this case, the pressure transducer gives signal to the controller that the “boom up”, “jib up”, “Fly-Jib up” and “winch up” movements should be stopped.

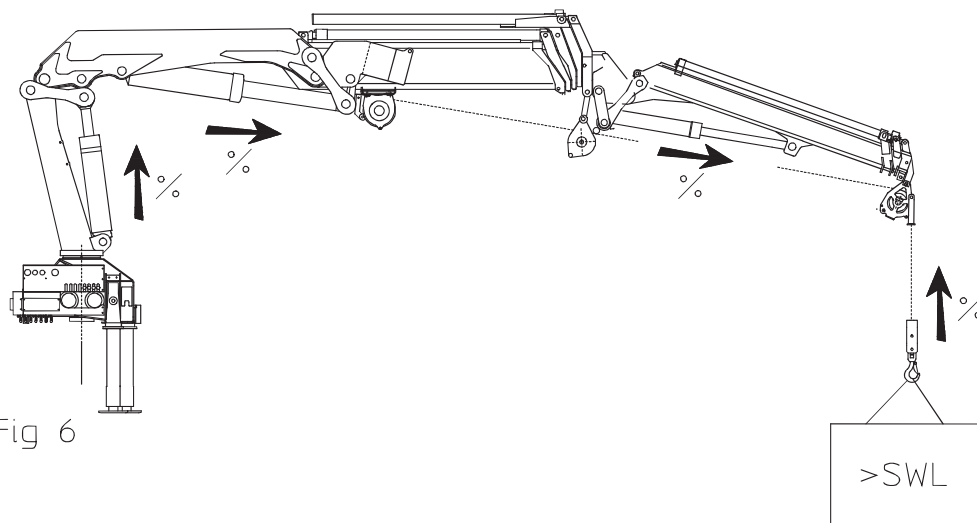


Fig 6



- **Please note!**

If the loader is fitted with a Fly-Jib while working with a winch, the max. permissible load on the winch is reduced corresponding to the max. lifting capacity of the Fly-Jib (or its manual extension(s)) at maximum reach.

If the Fly-Jib is removed, and the winch is operated, the lifting capacity of the winch is increased to the normal level.

- **Please note!**

When working with winch, only a smaller load (depending on the type of winch) can be operated by means of the “*extension out*” function on the loader or the Fly-Jib respectively.

Only if working with the “*winch down*” function at the same time, it will be possible to move a nominal load hanging in the wire of the winch by means of the “*extension out*” function on the loader or the Fly-Jib respectively.

- When the wire is eased from the winch drum and there are approx. 3 winds of wire left on the winch drum, the largest proximity switch gives signal to the controller that the “*winch ease*” movement should be stopped.

The proximity switch has two diodes with the following indications:

- During loader operation, the green POWER diode is lit (otherwise it is turned off).
  - When there are more than 3 winds of wire left on the winch drum, the yellow LOAD ON diode is lit.
  - When there are only 3 winds of wire left on the winch drum, and the “*winch down*” movement has been stopped, the yellow LOAD ON diode is no longer lit.
- In case of too much wire on the winch drum (i.e. overfilling or lopsided winding of the wire) the smallest proximity switch gives signal to the controller that the “*winch up*” movement should be stopped.

The proximity switch has a diode, which during loader operation, indicates as follows:

- When the winch is working correctly and the winch drum is not overfilled, the yellow diode is lit.
- In case of too much wire on the winch drum, and the “*winch up*” movement has been stopped, the yellow diode is no longer lit.



## 20.5 Signalling during loader operation with winch

During loader operation with winch, the RCL 5300 controller's diodes indicate if the loader, the Fly-Jib, the winch or the wire is overloaded.

The controller always indicates the function that has the largest load.

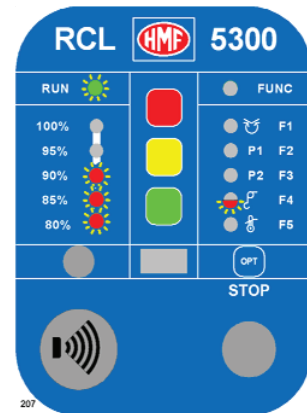
## 20.6 Load indication for winch

During loader operation, where it is the winch that has the largest load, the following is indicated:

- The diodes indicate a load between 80% and 100% on the winch.
- The winch (F4) diode is flashing

## 20.7 Indication at a winch load of 90%

- The 80%, 85% and 90% diodes are constantly lit.
- The winch (F4) diode is flashing (between 80% and 100%).
- The buzzer gives a periodic signal.

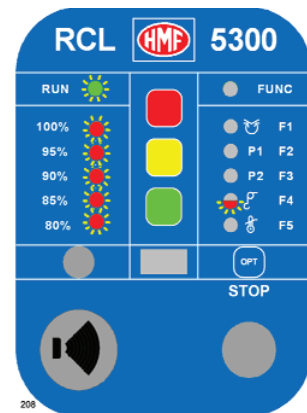


## 20.8 Indication at a winch load of 100%

- The 80% through 100% diodes are constantly lit.
- The winch (F4) diode is constantly lit
- The display indicates **T.c.l.**
- The buzzer gives a constant signal

The dump valve opens to tank and the loader movement causing the overload is stopped.

Only loader functions reducing the load on the winch can be operated.








## 20.9 Indication in case of not enough wire on the winch drum

A proximity switch registers how many winds of wire that are left on the winch drum. When there are 3 winds of wire left on the drum, the ease movement is stopped.


The following is indicated:

Stop at the "Winch – down"-function (control lever activated)	Control lever for winch in neutral position.
<ul style="list-style-type: none"> <li>The winch (F4) diode is lit</li> <li>The buzzer gives a constant signal</li> <li>The display indicates <b>E.A.S.</b></li> </ul> 	<ul style="list-style-type: none"> <li>The winch (F4) diode is flashing</li> <li>The buzzer gives a periodic signal.</li> </ul>

## 20.10 Indication in case of too much wire on the winch drum

A proximity switch registers whether the wire is wound correctly on the winch drum. In case of the wire overfilling the winch drum, the hoist movement is stopped.

The following is indicated:

Stop at the "Winch – up"-function (control lever activated)	Control lever for winch in neutral position.
<ul style="list-style-type: none"> <li>The winch (F4) diode is lit</li> <li>The buzzer gives a constant signal</li> <li>The display indicates <b>d.r.A.</b></li> </ul> 	<ul style="list-style-type: none"> <li>The winch (F4) diode is flashing</li> <li>The buzzer gives a periodic signal.</li> </ul>



## 20.11 Warning when working with loader and winch

- The loader safety system prevents the loader and winch system from being overloaded, but being the operator you are still responsible for safe operation of the loader/winch.
- Do not try to lift a load that weighs more than indicated on the SWL label on the swivel hook. The value indicates the max. permissible stress on the wire.
- Always operate the winch in a considerate way, and make sure that the wire has a correct winding and not for instance lopsided winding.
- Never make diagonal movements with the winch. Only make vertical lifts with a winch.
- Never drag a load across a surface. The winch is only meant for lifting vertically.
- Constantly keep the wire tight when working with a winch. Stop the *winch down* movement as soon as the load is placed on the surface.
- Always operate the *winch up* movement carefully when the hook reaches the hoist stop.
- Avoid fast movements with the winch when working at a long reach.
- Avoid oscillation of the load when it is hanging in a long wire.
- Operate the winch carefully up and down, when working in high positions with loader and Fly-Jib, if any.
- Extend the jib extensions to the position where the load is to be handled by means of the winch. Avoid extending the extensions on the loader and the Fly-Jib when a load is hanging in the wire.
- Always respect when the safety system stops the loader/winch function and check what was the reason for the loader stop.



## 21. Electric activation, loader functions / stabilizers

IMT loaders with separate stabilizer valve block have an electric change-over valve, which leads the oil flow from the hydraulic pump either to the loader valve block or the stabilizer valve block.

Every time the RCL 5300 controller is started up, the change-over valve is automatically in a position where the valve block for the loader functions is ready for operation.

### 21.1 Operation of the stabilizer functions

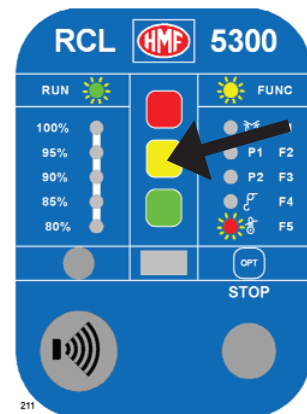
Before loader operation, extend the stabilizer beams and lower the stabilizer legs to the surface, according to the Instruction Manual of the loader.

Start up the RCL 5300 Safety System according to the chapter *Starting up of the loader* in this manual.

Push the yellow press button twice to select the stabilizer functions and the following is indicated:

- The yellow FUNC diode and the red F5 diode are constantly lit for 2 seconds.
- Both diodes are turned off again after 2 seconds, but the stabilizer function is still activated.
- The buzzer gives a periodic signal

Now the stabilizer legs can be lowered to the ground.



### 21.2 Operation of the loader functions

When the stabilizer beams have been extended and the stabilizer legs lowered, and the vehicle thus supported, the following must be carried out before operating loader functions:

Either:

- activate one of the loader's control levers (a function with spool sensor/alternatively radio remote control)

or:

- push the yellow press button *once*. On certain loader models you have to push the yellow press button *twice*.

It will now be possible to operate the loader functions.

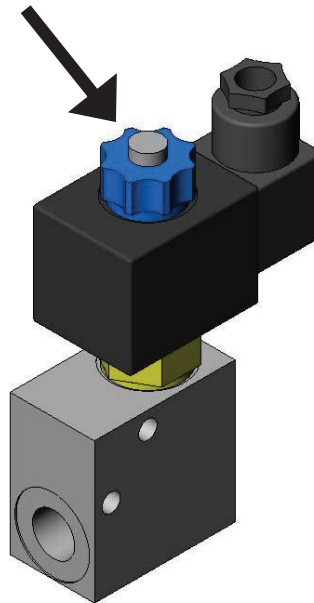


### 21.3 Emergency operation of the stabilizer functions

If the power supply for the change-over valve fails, it cannot be activated, and the stabilizer functions cannot be operated.

It is possible to turn a thumbscrew on the change-over valve outwards. The change-over valve is thus activated manually, and the stabilizers can then be operated.

Turn the thumbscrew inwards again, when operating the loader functions again.

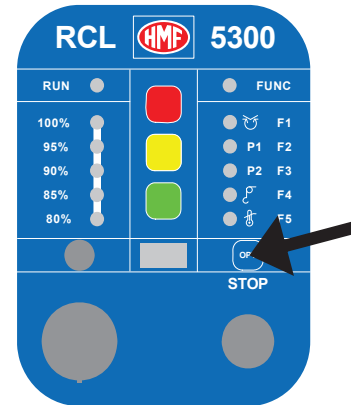




## 22 Blue Mode functions

On the RCL 5300 controller's indicator panel there is a blue **OPT** press button right above the stop button.

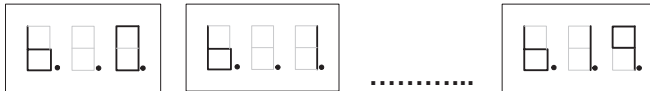
When pushing the **OPT** press button once, the Blue Mode is activated in the RCL 5300 controller. This gives access to extra functions in the safety system.



### 22.1 Operation of Blue Mode Functions

When pushing the **OPT** press button once, the first Blue Mode is indicated in the display, i.e. **b. .0.** (b0).

When pushing the **OPT** press button several times, it is possible to choose between Blue Modes from **b. .0.** through **b.1.9** (b0-b19).



Please note:

Only extra functions, which are activated in the safety system, are indicated in the display when pushing the press button between the b0-b19 Blue Modes.

Blue Modes 0-9 are primarily used in connection with loader equipment.

Blue Modes 10-19 are primarily used in connection with service and information.

After choosing the Blue Mode, push the yellow press button (**Y**) in order to select a Blue Mode function.

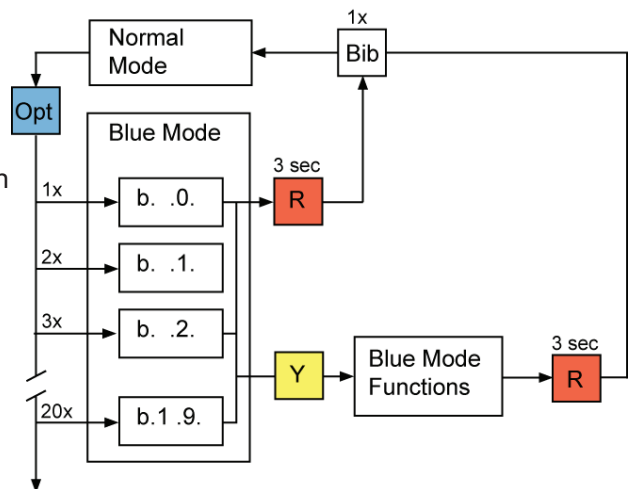
If the yellow press button (**Y**) is not being pushed, the system returns to Normal Mode.

When holding down the red press button (**R**) for 3 seconds, the system returns to Normal Mode.

#### Example of navigating in Blue Mode:

- Push the **OPT** press button to activate the Blue Mode. The display shows **b. .0.**
- Push the **OPT** press button several times to select a certain Blue Mode (b0-b19).
- After choosing a Blue Mode (b0-b19), push the yellow press button (**Y**) in order to select a Blue Mode function.
- To return to Normal Mode, hold down the red press button (**R**) for 3 seconds. The buzzer confirms by a beep.

Choice of different extra functions in Blue Mode is described for each extra function in this instruction manual.





## 23 Indication system, manual extensions

### 23.1 In general about manual extensions

If one or several manual extensions are mounted at the end of the hydraulic jib extensions, the loader operator has to pay attention to certain safety aspects. Please also see the *Instruction Manual* of the loader.

Manual extensions are **not** in all situations covered by the safety system protecting the loader's hydraulic boom system against overloading.

In the following examples, a load is lifted in the hook positioned in the hook suspension on the manual extension (or several manual extensions).

Example 1:

The manual extensions are protected against overloading, only if all hydraulic extensions are fully extended.

Example 2:

If one or several hydraulic extensions are not extended, the loader is capable of lifting a load that weighs more than the max. permissible load indicated on the lifting capacity diagram. The safety system does not interfere before the loader's hydraulic boom system is at the max. permissible limit, i.e. the manual extension is being overloaded.

When lifting a load in a manual extension, it is therefore up to the operator not to exceed the max. permissible limit of the manual extension indicated on the lifting capacity diagram.

### 23.2 The indication system

When a loader is supplied with one or several manual extensions, an indication system is activated in the RCL 5300 controller.

By means of the indication system, the operator can make sure that a manual extension is not being overloaded by the load, which it is going to lift, even though all hydraulic extensions are not extended.

The indication system is used for protection of manual extensions, which are fitted either at the end of the loader's hydraulic extensions or, if the loader has a Fly-Jib fitted, at the end of the Fly-Jib's extensions.

**Please note:** The indication system is not an automatically acting system. By means of the indication system, the operator must make sure that the load can be lifted without overloading the manual extension.



### **23.3 The functioning of the indication system**

In a working situation where a load is to be lifted in a manual extension, the indication system is used as an auxiliary function for estimating whether the load has the expected weight, and whether it can be lifted without overloading the manual extension.

Based on the given working situation, i.e. the number of hydraulic extensions being extended, the lifting capacity of the loader must be adapted so that the manual extension is not being overloaded.

### **23.4 Using the indication system**

If a load with an unknown weight is to be lifted in a working situation where not all hydraulic extensions are extended (loader or Fly-Jib), the lifting capacity of the loader/Fly-Jib must be reduced corresponding to the max. permissible load of the manual extension.

Select the indication system for manual extensions in the Blue Mode functions (please see the relevant chapter). Then select the number of hydraulic extensions that are extended in the particular working situation, and the RCL 5300 Safety System reduces the loader's lifting capacity accordingly.

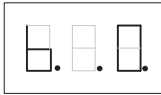
If the load is too heavy, the lifting movement is stopped to avoid overloading of the manual extension.

If the weight of the load is less than the max. permissible load of the manual extension, the lifting operation can continue.  
Then select Normal Mode to make it possible to extend the load at a longer reach.

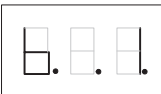


## 23.5 The indication system in Blue Mode

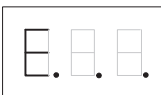
- Push the **OPT** press button once to activate the Blue Mode. The display shows **b. .0.**



- Push the **OPT** press button once to select Blue Mode **B..1.**



- Push the yellow press button (**Y**) once to select the function "Indication system, manual extensions" **E..**



- Push the yellow press button (**Y**) a number of times to select the number of hydraulic extensions that are extended in the particular working situation.

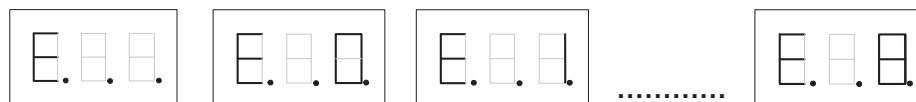
**E. . .** : "indication system, manual extensions" is disconnected.

**E. .0.** : No hydraulic extensions are extended.

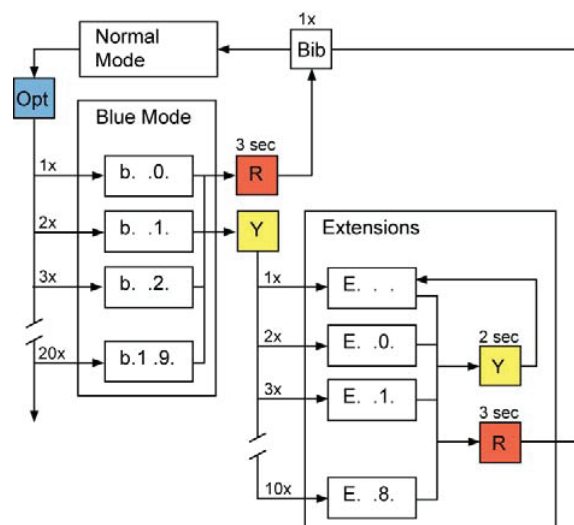
**E. .1.** : 1 hydraulic extension is extended.

**E. .2.** : 2 hydraulic extensions are extended.

Etc. Up to 8 hydraulic extensions are extended.



- If the yellow press button (**Y**) is kept down for 2 seconds, the system returns to **E. . .** ("indication system, manual extensions" is disconnected).
- If the red press button (**R**) is kept down for 3 seconds, the system returns to Normal Mode. The buzzer confirms by a beep.







### 23.6 Example of a working situation

Loader data:

- K6 extension system (6 hydraulic extensions)
- 2 manual extensions

Lifting task:

- A load is to be lifted at a distance where 3 hydraulic extensions are extended and the 2 manual extensions are extended.
- The load is to be put down at the max. reach of the loader.

The procedure is as follows:

1. Prepare the loader for working according to the start up procedure.
2. Approach the hook to the load (the 3 hydraulic extensions are extended)
3. Push the **OPT** press button once to activate the Blue Mode. The display shows **b. .0**.
4. Push the **OPT** press button once to select the function "Indication system, manual extensions". The display shows **b. .1**.
5. Push the yellow press button (**Y**) until the display shows **E. .3**. The indication system has now been set for the loader lifting a load in the manual extensions with 3 hydraulic extensions extended.
6. Carefully lift the load, and if the lifting movement is not stopped, the manual extensions are capable of lifting the load.
7. To return to Normal Mode, hold down the red press button (**R**) for 3 seconds. The buzzer confirms by a beep.
8. It is now possible to move the load freely in the entire working area of the loader (however limited by the max. load moment of the loader), without any risk of overloading the manual extensions.

The 80-100% load indication is shown as usual, and in case of loader stop because of overload when working with manual extensions, the display shows **TCL**.

### 23.7 Warning when working with manual extensions

- In general the load limits indicated on the lifting capacity diagram of the manual extensions must never be exceeded.
- The indication system is not automatically acting as is the loader's electronic safety system.
- The operator must activate the system himself, **before** lifting a load in a manual extension.
- The indication system is pre-set from the factory to function together with the number of manual extensions, which the loader is delivered with. The system does not function correctly, if more or fewer manual extensions have been fitted than the number originally supplied together with the loader.
- Great care should be taken during work with manual extensions. Always operate the loader in a calm and considerate way.



## 24 Activation of optional extras

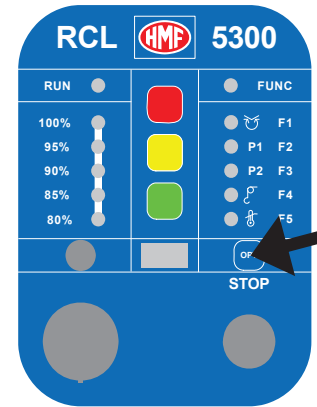
When the RCL 5300 controller is activated, it is possible to activate optional extras on the loader by means of the press buttons on the indicator panel.

### 24.1 Activation of horn

Depending on the equipment, the loader may be fitted with a horn – an acoustic warning signal.

The horn is activated by holding down the **OPT** pres button for 1.5 seconds.

Depending on the equipment fitted on the loader, the horn function cannot be operated by means of the **OPT** press button. In this case, the horn must then be activated by means of an external press button next to the RCL 5300 controller.



### 24.2 Activation of working light

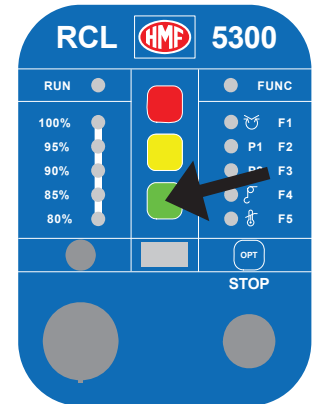
When the RCL 5300 controller is activated (the RUN diode is lit) it is possible to activate the spotlight by means of the green press button.

When pushing the green press button once more, the spotlight is turned off again.

Even though the controller goes into stand-by mode (please see the relevant chapter), it is possible to activate the spotlight.

#### **Please note!**

When disconnecting the buzzer (please see the relevant chapter), use the green press button. Therefore the use of this function will turn on/off the projector.





### 24.3 Indication of working hours

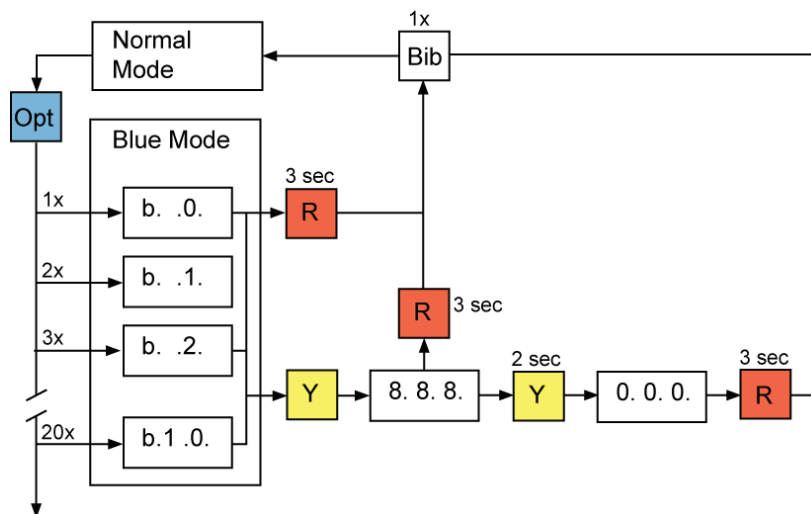
An hour counter in the RCL 5300 controller registers the loader's working hours. The hour counter can be used for registering the number of hours used for a given working task. By means of the Blue Mode function (please see the relevant chapter), it is possible to read the number of hours on the display of the indicator panel.

#### Indication of working hours by means of the Blue Mode function

- Push the **OPT** press button to activate the Blue Mode. The display shows **b. .0.**
- Push the **OPT** press button several times to select Blue Mode **b.1.0.**
- Push the yellow pressbutton (**Y**) and the display shows a number of hours.  
If for example **8.8.8.** is indicated, the loader has been working 888 hours since the last time the counter was reset.
- To return to Normal Mode, hold down the red press button (**R**) for 3 seconds. The buzzer confirms by a beep.

#### 0-setting the hour counter:

- Push the **OPT** press button to activate the Blue Mode. The display shows **b. .0.**
- Push the **OPT** press button several times to select Blue Mode **b.1.0.**
- Push the yellow pressbutton (**Y**) and the display shows a number of hours.
- Keep the yellow press button down for 2 seconds, and the hour counter is zero-set.
- To return to Normal Mode, hold down the red press button (**R**) for 3 seconds. The buzzer confirms by a beep.





## 25 Service functions

When the RCL 5300 controller is activated, it is possible to activate extra functions by means of the press buttons on the indicator panel.

### 25.1 Service indicator

The IMT Service Point can program the RCL 5300 controller to give an indication, when it is time for the next service overhaul of the loader.

There can be programmed two types of indication on the display:

- the remaining number of working hours, or
- the remaining number of days before the service overhaul should take place.

Each time the safety system of the loader is started up, the display indicates for 10 seconds the time of the next service overhaul.

Display	Explanation
	The service indication states that there is between 0 and 99 working hours until the next service overhaul of the loader.
	The service indication states that there is between 0 and 40 working days until the next service overhaul of the loader.

## 26 Errors in the safety system

### 26.1 Error indication

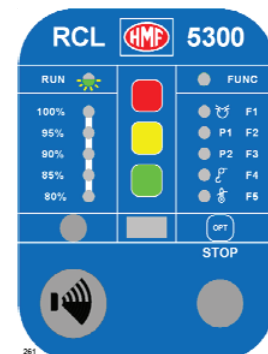
If, during loader operation, a system error occurs internally in the controller or externally in plugs, cables, sensors, etc., the controller indicates as follows:

- The RUN diode starts to flash
- The buzzer gives a periodic signal.
- The display shows an error code

Display	Explanation
	Luminous numbers between <b>0.0.1.</b> and <b>9.9.9.</b> indicate error codes for different error types in the safety system.

**In case of critical system errors** the buzzer gives a constant signal and the dump valve opens to tank (all loader movements are stopped).

Certain error codes that are indicated in the display, are described in the chapter – Troubleshooting – in this instruction manual.





## 26.2 Interference from the safety system in case of errors

System errors are divided in 3 categories (0, 1 and 2) with regards to hazard, i.e. which intervention the safety system should make.

Type of error	Interference from the safety system	Explanation
Non-critical system errors Fault category 0	Only error indication (warning)	The present loader operation can be finished.
Less critical system errors Fault category 1	Error indication and reduction of lifting capacity	The present loader operation can be finished. The performance of the loader is reduced to 90%.
Critical system errors Fault category 2	Error indication and loader stop	The loader is stopped, but emergency operation of the loader (please see chapter in this manual) into stowing position can take place.

### Please note!

No matter which fault category, the error **must** be found and remedied at an authorized IMT Service Point.

## 26.3 Emergency operation of the loader

In connection with a critical system error, the following is indicated:

- The RUN diode flashes
- The buzzer gives a constant signal
- The display shows an error code

The loader is stopped, but emergency operation of the loader can take place at the same time as **the red press button is kept down**. It is thus possible for the operator to move the loader into stowing position and drive to a service point.

### Please note!

In case of an error in a dump valve (critical system error) emergency operation is not possible.



## 27 Troubleshooting

If the controller indicates a system error – the RUN diode flashes and the buzzer gives a periodic/constant signal (please see chapter on Error Indication) – the display shows an error code. Some error codes, and errors which the operator can check immediately, are indicated in the table – RCL 5300 error codes.

In case of other error types than the ones mentioned in the table, please contact an IMT Service Center.

**Table, error codes**

Error code	Fault category	Type of error	Possible remedy
001	-	The stop button on the RCL 5300 or the remote control box is activated	Deactivate all stop buttons
099	2	The controller is overloaded	Deactivate the RCL Safety System by means of the stop button and reactivate it again.
471	2	Dump valve, function	As regards the sensor in question, please check: Cable and socket-outlet and plug for damage, bad connections etc. In case of an error in a sensor, please contact an IMT Service Center.
485	2	Spool sensor, slewing	
486	1	Spool sensor, boom	
487	1	Spool sensor, jib	
488	1	Spool sensor, extension	
489	1	Spool sensor, Fly-Jib - jib	
490	1	Spool sensor, Fly-Jib - extension	
491	1	Spool sensor, winch	
501	2	Pressure transducer, boom-M1, low signal	
502	2	Pressure transducer, boom-M2, low signal	
503	2	Pressure transducer, boom-M1, low signal	
507	2	Pressure transducer, Fly-Jib-M1, low signal	
508	2	Pressure transducer, Fly-Jib-M2, low signal	
509	2	Pressure transducer, Fly-Jib-C1, low signal	
511	2	Pressure transducer, winch-M1, low signal	
540	1	Temperature sensor, low signal	
551	2	Pressure transducer, boom-M1, high signal	
552	2	Pressure transducer, boom-M2, high signal	
553	2	Pressure transducer, boom-C1, high signal	
557	2	Pressure transducer, Fly-Jib-M1, high signal	
558	2	Pressure transducer, Fly-Jib-M2, high signal	
559	2	Pressure transducer, Fly-Jib-C1, high signal	
561	2	Pressure transducer, winch-M1, high signal	
590	1	Temperature sensor, high signal	
701	2	Dump valve, low signal	
703	1	Stabilizer change over valve, low signal	
704	1	HDL valve, low signal	
801	1	Dump valve, high signal	
803	1	Stabilizer change over valve, high signal	
804	1	HDL valve, high signal	



## 28 Technical Data RCL

### In General

Power supply	9 - 30 volt DC (max. voltage peak 34 volt)
Cabinet	Plastic cabinet with hinged cover
Terminals	10 Amp - 1.5 mm <sup>2</sup> stainless terminals in the plug
EMC	EN61000-4-4/A2:2001 and EN61000-4-2/A2:2001
Density	IP66 (IEC 60529 and NT Elec 023)
Working temperature	-30°C through +60°C. (IEC 60068-2-1/Ad and IEC 60068-2-30/Bd)
Storage temperature	-40°C through +70°C. (IEC 60068-2-1/Ad and IEC 60068-2-30/Bd)
All tests have been carried out according to the IEC 60068-2: Basic Environmental Testing Procedure.	

### Specifically

Technical data	RCL5300	RCL5301	RCL5305	FJC5330	WIC5333
Digital inputs	5	5	4	2	2
Analogue inputs	7	7	4	4	4
Digital outputs	-	-	2	2	2
PWM proportional outputs	4	4	2	2	2
Capacity, outputs	2 Amp	2 Amp	2 Amp	2 Amp	2 Amp
System Communication	CAN bus	CAN bus	CAN bus	CAN bus	CAN bus
CAN bus capacity	10 Amp	10 Amp	10 Amp	10 Amp	10 Amp
Connection – PC or service terminal	External M12	External M12	External M12	None	None
Cable lead-in	22	22	22	13	13
Diodes on indicator panel	12	12	12	0	0
Press buttons on indicator panel	4	4	4	0	0
Print clamps	61	61	44	28	38
Fuses	Automatic	Automatic	Automatic	Automatic	Automatic
Power consumption approx.	20 Watt	30 Watt	20 Watt	15 Watt	15 Watt
Dimensions of cabinet (H x W x L), [mm]	195x168x91	195x168x91	195x168x91	142x160x54	142x160x54
Weight, approx. [kg]	2.0	2.5	2.0	1.5	1.5
Integrated stop button	yes	yes	yes	no	no
Integrated buzzer	yes	yes	yes	no	no
Monitoring	yes	yes	yes	yes	yes
Programmable	yes	yes	yes	yes	yes
Editable parameters	yes	yes	yes	yes	yes
Black box	yes	yes	yes	no	no
Power, ON/OFF circuit	yes	yes	yes	yes	yes
7-segment display	yes	yes	yes	no	no
Angle sensor	no	no	no	yes	yes
Heel sensor	no	yes	no	no	no
Temperature sensor	yes	yes	no	no	no