CLAUDIUS PETERS

Cooler Grate Motion Control GMC

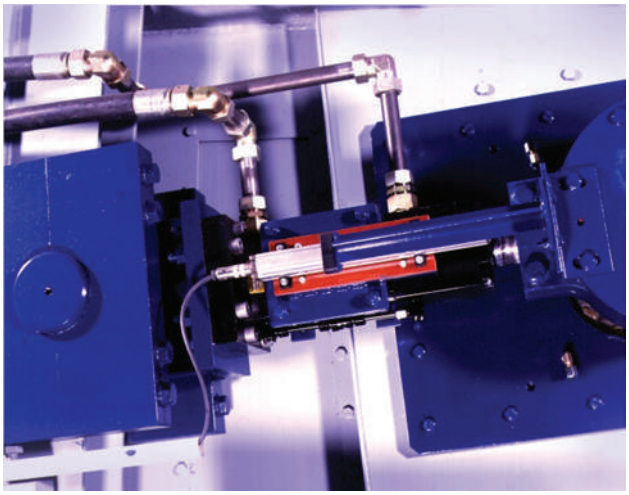
The Grate Motion Control box (GMC) is a major part of the hydraulic grate drive of Claudius Peters clinker coolers. One GMC is used for each cooler grate.

The GMC converts the master signal of the 'clinker bed height' control loop into a control signal, which changes the grate speed (number of strokes) via a hydraulic proportional valve. In addition, the GMC controls and monitors all the proportional valve functions as well as the grate motion.

The position of the piston is measured using a contactless, absolute-position measuring device (see picture right), which is fitted directly to the hydraulic cylinder.

With the GMC, the full stroke length of the piston can be utilized. Irrespective of if the grate is empty or full, or if it is running slow or fast, the stroke length remains constant. Additional safety measures, such as the use of limit switches or proximity switches, are not required. And, because of the resulting lower number of cycles, wear on moving parts is reduced and service life increased.

Because of its high compatibility, replacing an existing LCB1 control box with the latest GMC box can be done with a minimum of wiring and control software modifications. Replacement of the old proximity switches with the new position measuring system is also straightforward. All the advantages of the latest control system and HMI can then be used straight away.



Hydraulic cylinder with mounted position transducer and sensor

Modification Kit Main Components:

- **Local control box – GMC**
- **High-precision cylinder position measuring system – contactless micropulse**

Cooler Grate Motion Control GMC – Packages

Year of cooler installation		1976-1990	1991-1993	1994-1997	1998-2000	2001-2020	2021-
Modification		GMC modification possible					
Technical design							
Hydraulic Drive		√	√	√	√	√	√
Original stroke length control		X	By limit switches			By position measuring system	
Proportional Valve technology		X	√	√	√	√	√
Grate Motion Control type		X	LCB1: Microcontroller	LCB1: PLC Type S5	LCB1: PLC Type S7-300	GMC: PLC Type S7-300	GMC: PLC Type S7-1500
Critical spare part available		X	X	X	Partial only	Partial only	√
Modification package	**Package type**						
Hydraulic Drive modification	HYD MOD	√	X	X	X	X	X
GMC and Position Measuring System	GMC	√ (only with HYD MOD)	√	√	√	√	X

Modification packages for Claudius Peters Grate Cooler with hydraulic drive

Claudius Peters grate cooler control block

Claudius Peters GMC control panel

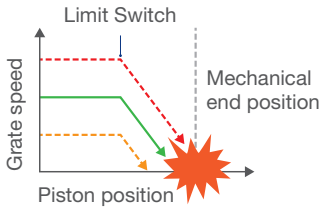
Comparison of Grate Cooler Controllers

Conventional limit switch method:

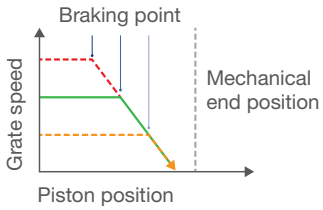
- **Stroke length is approx. 20% below the optimum**
- **Approx. 25% increase in stroke frequency creating additional wear on the grate plates**
- **Incorrect setting of the limit switch position and/or the ramp parameters can lead to cylinder damage**
- **Limit switches can become loose or damaged during operation – then mechanical cylinder end positions can be reached and damage the cylinder**

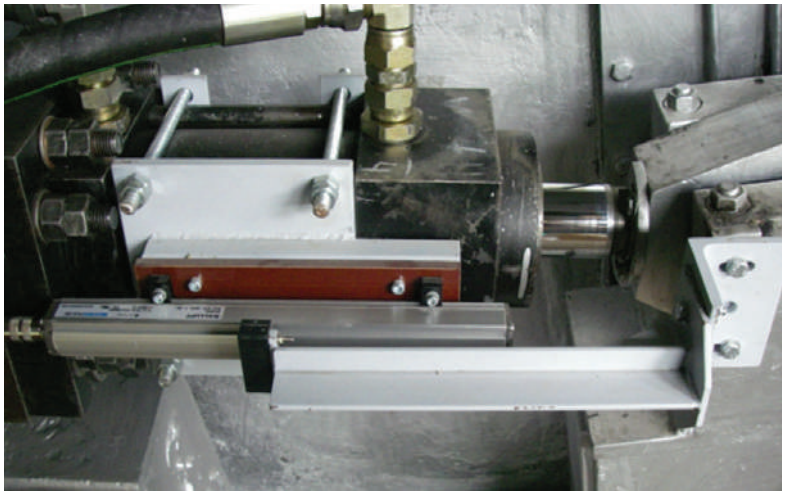
Hydraulic unit for conventional grate cooler

Conventional control with limit switch



Continuous control with GMC





Contactless high precision positioning transducer with magnetic sensor

Continuous control method:

- **Consistent optimum stroke length, independent of grate speed and load resulting in lower stroke frequency and more consistent cooler operation**
- **Reduced stroke frequency creates less wear on grate plates**
- **Avoids cylinder damage caused by reaching mechanical cylinder end positions – means safer operation.**
- **Continuous motion monitoring of the grate enables high availability**
- **Easy adjustment and commissioning gives short conversion times**
- **Auto adjustment of braking point at any speed**

GMC at a glance – Features & Benefits

Local GMC panel with HMI and lockable protection window

- **Stat-of-the-art industrial components (Siemens PLC & HMI)**
- **Spare parts available**
- **Possible control via fieldbus (PROFIBUS DP)**
- **Full proportional valve control**
- **Precise grate positioning for maintenance**
- **Continuous monitoring of grate movement**
- **Automatic detection of cylinder end position**
- **Self adjustment of position measuring system**
- **Integrated grate speed controller**
- **Integrated stroke length controller**
- **Local manual and automatic grate operation**
- **Overload mode for cooler troubleshooting**
- **Simple and safe commissioning**
- **User friendly operator panel (key & touch)**
- **Trend screens**
- **Protection against unauthorized operation with different user levels**

Precise control combined with easy operation

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Issue 1. Due to a policy of continued improvement, we reserve the right to change any specification without prior notice.
ERRORS & OMISSIONS EXCEPTED.