



Carburizing process controller MCON Carbo

Special features:

- Touch screen color display and menu guided operation
- 3 loops control : temperature, C level and oil quenching temperature
- Various types of thermocouples and RTD sensors
- Various sensors support : O₂, Lambda probe or CO₂ analyzer
- Soot limit monitoring
- One or two sensors can be used for simultaneous measurement of C level
- Automatic switching between probes
- Probes maintenance and monitoring (probes flushing and internal resistance monitoring)
- Program guided control for temperature, C level and quenching temperature
- Define tracks states to every program segment
- Alarms for monitoring measurement values
- Foiltest C level correction with up to 5 corrections and interpolation function
- Logging measurements data to log file
- Graph feature for displaying trend and measurements history
- User access levels
- Parameters and programs backup via USB stick
- User levels for better security
- USB software update
- Inputs and outputs flexibility
- Communication interfaces: MODBUS TCP/RTU, Webserver, Carbovis, PROFIBUS

Function:

MCON Carbo device is standard DIN ¼ controller which has the ability to control furnace temperature, C level in the furnace atmosphere quenching temperature. It provides all functions for carburizing process control in one device such as 3 loops control, probes maintenance, C level correction, graphical presentation and logging and program guided process control.

Operation is very simple owing touch screen interface and color display. There are also foil keys which can be used in parallel with touch screen.

Device has enough inputs and outputs to cover most requirements in carburizing applications. Analog inputs are used for temperature and probes sensors or external setpoint transmitters and gas analyzers.

Process can be guided by program or fixed setpoints. Every program segment can trigger certain tracks (desired digital outputs) which can send be send to the PLC or even do some low level automatization without PLC.

C level measurement is performed indirectly by measurement of temperature and oxygen or CO₂ content in furnace atmosphere. C level accuracy can be improved with foiltest feature and special correction algorithm.

Technical data:

Construction:

- ABS DIN ¼ case for front mounting
- Type of protection IP54
- Dimensions 96 x 96 x 111 mm

Power supply:

- AC 85VAC...265VAC, 50-60Hz or DC 10VDC...36VDC. Power consumption 15VA

Display:

- Color TFT display, 320 x 240 px, 16it, 3.5' with resistive touch screen

Operation:

- Touch screen menu guided and and/or four keys (up/down/enter/escape)

Control loops:

- 3 control loops (%C control, furnace temperature, oil quenching)
- 3 control parameters preset per each loop
- PID or On/Off control type
- Control output types: heating/cooling, gas/air, valve control or analog output
- Custom assigning digital outputs for control

Setpoints:

- 4 fixed setpoints, external and remote setpoint
- 99 programs with quenching temperature and C level and furnace temperature setpoints.
- Up to 24 segments per program
- 16 tracks per segment
- Custom assigning digital output for every track
- Production for sequentially executing up to 5 programs in chain

C level measurement:

- Sensor for measurement: O2, lambda probe or CO2 analyzer
- One or two sensors can be used
- Fixed or measured CO value.
- C level measuring range: 0 – 2.0 %C
- Correction with up to 5 correction points and spline interpolation for both probes

Alarms:

- Up to 4 user defined alarms for monitoring measurement values and change rates.
- Custom assigning digital outputs for alarms

Logging:

- Logging sample time from 1 to 1000 seconds
- Up to 20 log files can be stored to internal memory.
- Logging on user demand or time activated.
- Transferring log data to USB stick
- Special software for viewing log data

User access levels:

- Up to 10 user accounts can be stored
- 6 access level to grant privilege to users

Communication interfaces:

- Ethernet
- isolated RS485/422 (optional)
- PROFIBUS (optional)
- non isolated RS485/422 (standard)

Supported protocols:

- MODBUS Master RTU or TCP
- MODBUS Slave RTU or TCP
- Webserver
- PROFIBUS
- Carbovis communication interface

Analog inputs: 5 or 7 isolated analog inputs

- AIN1 : thermocouple (B,C,E,J,K,L,M,N,R,S,T) / voltage 0-100mV
- AIN2: Lambda or O₂ probe / voltage 200 – 1300 mV
- AIN3, AIN4 and AIN5: Lambda or O₂ probe or CO₂ analyzer or external set point / current or voltage input
- Optionally AIN6 and AIN7: RTD input for quenching or ambient temperature measurement / PT100 or PT 1000

Thermocouple input ranges:

Type	Measuring range	Generating accuracy	resolution
B	PtRh-Pt6%	250...1820°C	<3°C
C	W5%Re-W26%Re	0...2315°C	<2°C
E	NiCr-CuNi	-200...1000°C	<2°C
J	Fe-CuNi	-210...1200°C	<2°C
K	NiCr-Ni	-200...1350°C	<2°C
L	Fe-CuNi DIN	-200...900°C	<2°C
M	NiMo/NiCo	-50...1410°C	<2°C
N	Nicrosil-Nisil	-200...1300°C	<2°C
R	PtRh-Pt13%	-50...1760°C	<2°C
S	PtRh-Pt10%	-50...1760°C	<2°C
T	Cu-CuNi	-200...400°C	<2°C
Cold junction sensor		-25°C...+85°C	1,5°C

Analog inputs ranges

Type	Measuring range	Measuring accuracy	resolution
Voltage (0 – 10 V)	-0.5V...+10V**	0.1%	10 µV
Voltage	0- 100 mV	0.1%	0,2 mV
Current	-5mA...+25mA	0.1%	1µA
Lambda or O ₂ probe	-200 – 1300 mV	0.1 %	1 µV
PT 100	-200.0 ... 850.0 °C	0.1 %	0.05 °C
PT 1000	-200.0 ... 850.0 °C	0.1 %	0.05 °C

Analog outputs:

- 2 or 4 isolated analog outputs depending on installed modules
- Scaled to: setpoint, control output, C level, atmosphere temperature or quenching temperature

Analog outputs ranges

Type	Ratings	Max. Load	Resolution	Accuracy
Voltage output	0V...+10V 2V...+10V	>2kΩ	16 bit	0.05%
Current output	0mA...20mA 4mA...20mA	<500Ω	16 bit	0.05%

Digital inputs:

- 3 isolated digital inputs
- Trigger voltage > 8V
- Hysteresis 2V
- IN0: program pause
- IN1: switch to next segment
- IN3: inputs disable (lock user interface)

Digital outputs:

- 2 fixed digital outputs: NO/ 250V/ 5 A
- Up to 24 additional digital outputs depending on installed modules

Digital outputs functions:

- control outputs (heating/cooling, gas/air and motor valve control), alarm outputs, program tracks, probe flushing.

Digital output modules (up to 6 modules can be installed)

Type	Standard / option	Ratings
REL1	4 common Relays, NO, contact	250V/3A
REL2	2 separate Relays, NO/NC contacts	250V/5A
REL3	3 common relays, NO contacts	250V/3A
OC12 module	12 open collector outputs with common ground	24V/100 mA

Climate:

- Storage: -10 °C - + 60 °C
- Operation: °C - + 50 °C

Optional accessories:

- Auxiliary unit REL45 (only if OC12 module is used)
- Carbovis 3.4 visualization software
- Carbomat300 log viewer software