MONITOR EMCOTRONIC DATA CONTROLLER SOFTWARE DC 3.051

1. General

1.1 Monitor data signed with a "T1" are only for T1-controls and must be 0 for M1-controls. Reverse function for monitor data signed with a "M1".

1.2 The values in the brackets are recommended from the manufacturer and should not be changed without consultation. In case different values are necessary for different machine types, refer to the attached table. If there is an asterisk instead of a number in the bracket, the value must be adapted to the machine.

1.3 The numbers in the circular brackets show a range of numbers which are allowed for these parameters.

1.4 For the parameters which are selected by bits: -To use this function, the bit must be high. The value of the bits are

BIT	VALUE
0	1
1	2
2	4
3	8
4	16
5	32
6	64
7	128

If you will activate more than one bit, add the value of the activated bits together and write the sum in the parameter.

2. User Monitor (MON)

Parameters: D, L, R

D0...Baud rate for serial interface (150-2400) <300>
D1...Priority of door switch <1>

D1=1: Door switch in manual and reference mode not active
D1=3: Additional to priority 1, it is possible to move the axis in AUTO/DRYRUN but not possible to switch on the main spindle
D1=7: Additional to priority 3, it is possible in AUTO/DRYRUN, AUTO/SINGLE and EXECUTE mode to run the machine with main spindle and open door

(For all 3 priorities, the hardware modification on axis controller is necessary and parameter G7 bit 0 must be activated)

D2...Not used <0>
D3...Minimum depth of cut used in the cycle G85/87/88. (T1 or G83/86 [M1]) in urn <100>
D4...Number of clean up (free) passes for cycle 85 <1> (T1)
D5...The distance of the drill withdraws to break chips in the auto drill cycle G86 (T1/M1) and G87 (T1) <500>
D6...Preset for parts counter <1>
D7...Actual value of parts counter <0>
D8...Not used <0>
D9...Spindle position for M19, if no S word is programmed <0>

L0...MSD bits 17
bit 0...Diameter dimensions for input data (T1) <1>
bit 1...Inch dimensional for input data G70 <*> 0
bit 2...Displaying of the incoming data through serial interface on screen, also, there is no checking of an already existing program, that means, you can write over an already existing program in the memory <0>
bit 3...Deactivating of the software limit switch in manual mode <0>
bit 4...Tool measuring with reference workpiece (manual mode T1) 1
bit 5...Not used <0>
bit 6...Memory locked <0>
bit 7...Control locked <0>

L1...MSD bits 24
bit 0...Collet mode after power on initial <*> 0
bit 1...Automatic feedhold while moving parts catcher <0>
bit 2...M51 mode for bi-directional tool turret after power on initial <*> 0
bit 3...Modified tool turret control: <0> 1
a. indexing to the next position by reset
b. Indexing without JOG enable button in manual mode
c. Ml tool turret: indexing procedure:
feed override = 100%, switch function inactivate <0>
bit 4...Parts counter active <0> 1
bit 5...Parts preset counter active <0>
bit 6...Ignore end of bar signal <0>
bit 7...Door automatic: M53 mode after power-on initial <0>

L2...G-code group 9 change after power on initial (M1) <*> 0

L3...Lowest number for sub-programs <80>

L4...Data format for serial interface <1> ->121

bit 0...ISO-data format
bit 1...At read-out end of a program, a "Control Z" will be transmitted (1A H)
bit 2-7.Configuration of serial interface, if all bits are following configuration will be used

1 start bit
7 data bits
1 stop tit
even parity

bit 2-3.NUMBER OF DATA BITS	0/1...7 bits
	1/1...8 bits
bit 4...Parity enable	
bit 5...Even parity	
bit 6-7.Number of STOP bits	0/0...no stop bits
	1/0...1 stop bit
	0/1...1.5 stop bits
	1/1...2 stop bits

L5...MSD bits 0

bit 0...Alarm 57 will not appear in G41/42 mode <0>
bit 1...Not used <0>
bit 2...Not used <0>
bit 3...Not used <0>
bit 4...At the beginning and at the end, there will be 50 ASCII signs ".0" transmitted (for punched tape) 0
bit 7...Not used <0>

L6...Limitation of the tool data output to interface (100) <99> 8->99 ?

L7...MSD bits

bit 0...Barfeeder active <*> 0
bit 1...FMS mode active 0
bit 2...Not used <0>
bit 3...Not used <0>
bit 4...Not used <0>
bit 5...Not used <0>
bit 6...Not used <0>
bit 7...Not used <0>

L8...Not used <0>

L9...Not used <0>

R0…X reference position <*> 44.03
R1…Y reference position <M1: *, T1 = 0,000>
R2…Z reference position <*> 198.02
R3…+X software limit <*> 52.155
R4…+Y software limit <M1: *, T1: 10000,000>
R5…+Z software limit <*> 199.375
R6…-X software limit <*> -3.52
R7…-Y software limit <M1: *, T1: -10000,00> -9999.82
R8…- Z software limit <*> 23.20
R9…Software physical limit switch approach in manual mode {see table) <10> 10

3. Guarded Monitor (MONITOR)

Parameters F, G, M, O, S, T, X, Z

F0...Numerical input limit for parameter F, also maximum threading pitch <32767>
F1...Feed limit per minute Execute and Automatic mode mm/min (see table)
F2...Feed limit per minute in manual mode mm/min (see table)
F4...Manual slow feed (max. feedrate, prior to reference) mm/min <300>
F5...Dryrun feedrate mm/min (see table)
F6...Rapid traverse X-axis mm/min (see table)
F7...Rapid traverse Y-axis mm/min (see table)
F8...Rapid traverse Z-axis mm/min (see table)
F9...Feedrate for referencing the machine

F1=1000
F2=1000
F3=700

F5=700
F6=2000
F7=2000
F8=2000

0

G0...Tool turret type <*>
- <0>…No tool turret
- <1>…Type 0: EMCO simulation
- <2>…Type 1: Sauter tool turret without direction logic .
- <4>…Type 2: Sauter tool turret with direction logic
- <8>…Type 3: EMCO tool turret R3 orA7
- <16>..Type 4: Sauter hydraulic 4-tool turret
- <32>..Type 5: Duplomatic BRV 150
- <64>..Type 6: Duplomatic BSV 160 (with direction logic)
- <130>Type 130: M1 tool turret for VMC 100 (with direction logic)

G1...Tool turret timer 1 <*>
- Type 0: Signal period time for both tool turret output <10>
- Type 1,2: <0>
- Type 3: Time from confirming tool turret pos. to reversing the motor <R3-TT:4, A7-TT:1>
- Type 4: Time from confirming tool turret pos. to change of output signals <2>
- Type 5: Time from confirming tool turret pos. to reversing the motor <new motor drive board 1> <old motor drive board 0>
- Type 6: Time after index confirmation until motor switches off (units 800 us) <70>
- Type 130: Number of tool turret positions <10 for VMC 100 and 12 for VMC 200>

G2...Tool turret timer 2 <*>
- Type 0,2: <0>
- Type 1,5: Time between switching on the brake and switching off of motor andpre-index <1>
- Type 3: Time between direction change and to switch over to pulse operation <R3-TT:7, A7-TT:4>
- Type 4: Time between direction change and the end of the tool turret positioning process<7>
- Type 6: Time between signal turret indexed and releasing of the indexing magnet
- Type 130: Number of main spindle revolutions per tool turret segment <2>

G3...Tool turret <*>

Type 3: R3-TT <0>

A7-TT: bit 7 is the designation bit for DC-tool turret! Bit 0-6 are the bits for the"on" period of the cycle from the reverse pulsing signal in units 800us <130>

Type 5: Suppression of chattering of the position signal: number of necessary signals which equals results <30>

Type 6: Amount of time 0 the motor is idle before switching direction (units of 800us)<40>

Type 130: Positioning speed of main drive during indexing <20 for VMC 100 and 30 for VMC 200, otherwise 0>

G4...Tool turret <*>

Type 3: R3-TT: <0>

A7-TT: Switch off period of cycle from reversing pulsing signal (in units 800us) <3>

Type 130: Main spindle position at valid magazine 00 ...,- position <otherwise 0>

G5...MSD bits <*> 0

bit 0...Algebraic sign change in JOG mode X-axis

bit 1...Algebraic sign change in JOG mode Y-axis (M1)

bit 2...Algebraic sign change in JOG mode Z-axis

bit 3...Start to the reference point in minus direction X-axis

bit 4...Start to the reference point in minus direction Y-axis (M1)

bit 5...Start to the reference point in minus direction Z-axis

bit 6...Alarm 4 appears in JOG mode if you open the door (see parameter D1)

bit 7...Reference point limit switch for automatic referencing

G6...MSD bits for auto clamping device (T1) <*> 191

bit 0-5.Time for registration of the pressure switch at a hydraulic (1/10s) (0-63) clamping device

bit 6...Front activated air chuck

bit 7.. Activation of an auto clamping device

G7...MSD bits for peripherie. <*> 64

bit 0...Door limit switch linked at axis controller (see parameter D1)

bit 1...Activation of MI 13 and chuck monitoring control bit 2...Activation of MI 18/19 (cycle extern)

bit 3...Activation of MI 16/17 (clamping device open/close)

bit 4...Activation of MI 15 (external emergency off)

bit 5...Activation of barfeed

bit 6...Auto-tailstock active

bit 7...Hydraulic active

G8...MSD bits <*> 3

bit 0...Activation of an optical preset device for T1 control on automatic tool offset taking over for the M1 control

bit 1...Activation of extended interface to store offsets on tape or RS 232

bit 2...Activation of FMS software

bit 3...Activation of auto chip door

bit 4...Activation from external inputs MI20/21 (X16:6/5): quill left/right

bit 5...Activation from external input MI26 (X16B:18): external emergency off 2

bit 6...Activation from external input MI27 (X16B:17): external emergency off 3

bit 7...Activation of workpiece catcher device

G9...MSD bit <*> 0

bit 0...Parts catcher at Emcoturn 220
bit 1...Not used <0>
bit 2...Not used <0>
bit 3...Not used <0>
bit 4...Not used <0>
bit 5...Not used <0>
bit 6...Not used <0>
bit 7...Not used <0>

M0...Axis acceleration value (see table) M0=2500
M1...Spindle acceleration value <208> from AC 2.1 (see table) M1=<20> 23
M2...Spindle current LED indicator (see table) M2=280
M3...Spindle RPM indicator on screen <945 / 281 / 945 / 945 / 1705> from AC 2.1 (see table) M3=<1040> 1039
M4...Spindle resolution pulses/rev. (see table) (500 for Heidenhain encoder) M4=150
M5...Feed resolution axis steps/rnm (see table) M5=400
M6...Numerical limit for parameter D <32767>
M7...numerical limit for parameter N <9999>
M8...Numerical limit for parameter T (see table) M8=899
M9...Numerical limit for parameter L <9999>

N0...Numerical input limit for parameter 0 <6999>
N1...Not used <0>
N2...Not used <0>
N3...Not used <0>
N4...Not used <0>
N5...Not used <0>
N6...Not used <0>
N7...Not used <0>
N8...Not used <0>
N9...Not used <0>

O0...Numerical limit for parameter G <99>
O1...Numerical limit for parameter M <99>
O2...Not used <0>
O3...Not used <0>
O4...Adjust bits for VMC 200 tool turret

bit 0...Activation bit for VMC 200
bit 1...Output of dwell (adjusted under parameter O5), also by positioning of the main spindle before Z movements during tool changing
bit 2 Monitoring of the stretched sync-impulse during Z movements at tool changing
bit 3...Not used <0>
bit 4...Not used <0>
bit 5...Not used <0>
bit 6...Not used <0>
bit 7...Not used <0>

O5...M1-Tool turret type 130: 0

Dwell after changing the tool magazine to the down movement of the Z-slide (in 1/10 sec.) <2 at VMC 100, 4 at VMC 200>

O6...M1 Tool turret type 130: 0

Time period within the tool magazine has to reach the next position (in 1/10 sec.) <15>

O7...Automatic clamping device type front end chuck: 0

Dwell after activation of pressure switch input until the pneumatic chuck valve switches in off position (1/10 sec.) <13>

O8...MSD bits for axis controller: 0

bit 0...Position controlled main drive:

The control line main drive on/off stays on permanently (with the exception of emergency off)

bit 1...Not used <0>

bit 2...Not used <0>

bit 3...Not used <0>

bit 4-7 Adjustment of acceleration ramp for positioning the main drive <33 for VMC 100, 65 for VMC 200> .

O9...MSD bits for axis controller: 0

Dwell after starting the main spindle until it starts scanning the sync-impulse from the main spindle encoder <1 for VMC 100, 5 for VMC 200>

S0...Maximum spindle speed (see table) S0=<4000> 5000

S1...Minimum spindle speed (see table) S1=150

S2...Numerical input limit for spindle speed U/min. (see table) S2=<4000> 5000

S3...Steps per revolution of ballscrew X-axis (see table) S3=2000

S4...Steps per revolution of ballscrew Y-axis (see table) S4=2000

S5...Steps per revolution of ballscrew Z-axis (see table) S5=2000

S6...Memory available on data controller <4>

S7...MSD bits for lubrication system <*> S7=<20> 127

bit 0-6.Lubrication indicator comes on after 400000 AC motor steps <20m>

bit 7.Automatic lubrication active

bit 8-15Time of lubrication process 1/10 sec. <50> for 20m travel path and 5s impulse <20 / 20628 / 20 / 20628 / 50> .

S8...Positioning speed for M19 <50> 0

S9...Maximum spindle speed for low gear ratio 0

T0...Switching from lathe to milling machine

T0 = 0 Lathe (T1)

T0 = 255...Milling machine (M1)

T1...MSD bits for graphic mode: 0

bit 0...Activation of graphic button

bit 1...Graphic mode cannot be deactivated

bit 2...0nly for internal test purposes:

GC-commands in GRA-BUFF will be automatically deleted

bit 3...Not used <0>

bit 4...Not used <0>

bit 5...Not used <0>

bit 6...Not used <0>

bit 7...Not used <0>

T2...Selection of monitor type for graphic mode;

0...Standard Emcotronic monitor (15 kHz line frequency)

1...Is high resolution monitor (30 kHz line frequency)

T3…Reserved <0>

T4…MSD bits activation of optional T1-G coded <*> 1
bit 0…G96 activation of constant cutting speed (T1)
bit 1…Not used <0>
bit 2…Not used <0>
bit 3…Not used <0>
bit 4…Not used <0>
bit 5…Not used <0>
bit 6…Not used <0>
bit 7…Not used <0>

T5…MSD bits activation of optional T1/M1 G-codes <*> 3
bit 0…G41/42 tool nose radius compensation
bit 1...G25 subroutines activation
bit 2...Not used <0>
bit 3...Not used <0>
bit 4…Not used <0>
bit 5…Not used <0>
bit 6...Not used <0>
bit 7…Not used <0>

T6…MSD bits activation of optional M1 G-codes (M1) <*> 0
bit 0...G17 bit 1...G18
bit 2...G19 bit 3...G20
bit 4...G21
bit 5...G22
bit 6...Not used <0>
bit 7…Not used <0>

T7…MSD bits activation of optional T1 M-codes (T1) <*> 3
bit 0...M25/26 program controlled chuck
bit 1...M20/21 program controlled tailstock
bit 2…M23/24 program controlled parts catcher
bit 3…Not used <0>
bit 4…Not used <0>
bit 5…Not used <0>
bit 6…Not used <0>
bit 7…Not used <0>

T8…MSD bits activation of optional T1/M1 codes <*> 0
bit 0…M19 spindle exact stop
bit 1…Not used <0>
bit 2...Not used <0>
bit 3...Not used <0>
bit 4…Not used <0>
bit 5…Not used <0>
bit 6...Not used <0>
bit 7…Not used <0>

T9...MSD bits activation of optional M1 M-codes (M1) <*> 0

bit 0...M40/41
bit 1...Not used <0>
bit 2...Not used <0>
bit 3...Not used <0>
bit 4...Not used <0>
bit 5...Not used <0>
bit 6...Not used <0>
bit 7...Not used <0>

X0...Numerical input value limit X <393,7250, for F1P 157,5000>	X0=10000
X1...Numerical input value limit y <393,7250, for F1P 157,5000>	X1=10000
X2...Numerical input value limit Z <393,7250, for F1P 157,5000>	X2=10000
X3...Numerical input value limit U <393,7250; for F1P 157,5000>	X3=10000
X4...Numerical input value limit V <393,7250, for F1P 157,5000>	X4=10000
X5...Numerical input value limit W <393,7250, for F1P 157,5000>	X5=10000
X6...Numerical input value limit I <393,7250, for F1P 157,5000>	X6=10000
X7...Numerical input value limit J <393,7250, for F1P 157,5000>	X7=10000
X8...Numerical input value limit K <393,7250, for F1P 157,5000>	X8=10000
X9...Numerical input value limit R <3,9370, for F1P 157,4500>	X9=99.995

Z0...Numerical input limit P <393,7250, for F1P 157,5000>	Z0=10000
Z1...Not used <0>	Z1=0
Z2...Not used <0>	Z2=0
Z3...Back lash X	Z3=0.012
Z4...Back lash Y new axis controller (AC 2.1) necessary	Z4=0
Z5...Back lash Z	Z5=.002
Z6...Not used <0>	Z6=0
Z7...Not used <0>	Z7=0
Z8...M1 TT: changing position (Z-axis)	Z8=0
Z9...Z-offset of the reference tool for optical tool offset (T1) <-0,7874>	Z9=-19.997

4. Connection Assignments

4.1 Data Controller (terminal strip X17/bus print)

O0...Coolant ON/OFF
O1...Lubricant ON/OFF
O2...Close chuck/Open collet
O3...Open chuck/Close collet
O4...Alarm status output (x22a/1a)
I0...Door limit switch
I1...Pressure switch lubrication
I2...Coolant control input from motor driver board
I3...T1: End position monitoring clamping device or pressure switch front-end chuck
M1: 0V...fast transmission gear stage 24v..slow transmission gear stage
I4...System pressure chuck (or pressure switch chuck close/collet open) (x22a/3a)

4.2 Machine interface/terminal strip X16a on axis bus board (terminal designations 1-21 from top to bottom in brackets)

M00(10)...Tool turret forward
M01(11)...Tool turret backward
M02(12)...Tool turret pre-indexing magnet
M03(13)...Tool turret brake
M04(14)...M1 tool turret air clean
M05(15)...Not used
M06(16)...Not used
M07(17)...Hydraulic ON/OFF

MI0 (6)…TT position bit 0
MI1 (7)…TT position bit 1
MI2 (8)…TT position bit 2
MI3 (9)…TT strobe (position bit 3 in type 3/5)
MI4(18)...Control pre-indexing magnet (B7)
MI5(19)...Control tool turret indexed (B8)
MI6(20)...TT control input from motor drive board
MI7(21)...Not used (reserved for strobe for 12-station turret)

4.3 Machine interface: plugs X16b and X16c in board handle (numbers of the Panduit plug pins in brackets)

4.4 Top plug X16c

MI 8 (18)...Tailstock left hand end position
MI 9 (17)...Tailstock right hand end position
MI10(16)…Pressure switch tailstock
MI11(15)…Parts catcher in forward position
MI12(14)…Parts catcher swivelled out
MI13(13)…Pressure switch "chuck open/collet closed"
MI14(12)…End of bar (x22a/2a)
MI15(11)…External Emergency off (for barfeeder) (x22a/9c)
MI16(10)…Open clamping device
MI17 (9)...Close clamping device
MI18 (8)...Cycle start
MI19 (7)...Open door/Close door (FFS, later via EMCO bus)
MI20 (6)...Tailstock quill forward
MI21 (5)...Tailstock quill backward
MI22 (4)...Feedhold (FMS mode)
MI23 (3)...Reference/Automatic mode select (FMS mode)
MI24 (2)...Read-in program (FMS mode)
MI25(1)...Read-out program (FMS mode)

4.5 Bottom plug X16b

MI26(18)...Emergency off external 2
MI27(17)...Emergency off external 3
MI28(16)...Reserved for EMCO bus!
MI29(15)...Reserved for EMCO bus!
MI30(14)...Reserveo for EMCO bus!
MI31(13)...Reserved for EMCO bus!

M08(10) Tailstock left
M09 (9) Tailstock right
M010(8) Advance parts catcher
M011(7) Swivel in parts catcher
M012(6) Barfeeder
M013(5) Door close (x22a/6c)
M014(4) Status CYCLESTART (FMS, later via EMCO bus)
M015(3) Status main spindle stopped
M016(2) Status REFERENCE
M017(1) Status FEEDHOLD (FFS, later via EMCO bus)

Note: On plug X16b the inputs MI28-31 (pins 16-13) as well as the outputs M014-17 (pins 4-1) will be used later for the planned serial EMCO bus which will then assume the I/O functions connected there are present.

TABLE FOR SPECIFIC MACHINE TYPE PARAMETER

		ET120	ET220	ET140	ET240	F1P	F3CNC	VMC100	VMC200
	F1	1000	2200	2200	2200	700	2200	2200	4000
	F2	1000	2000	2000	2000	1000	2000	2000	3000
	F3	700	1000	1000	1000	700	1000	1000	3000
	F5	700	1500	1500	1500	700	1500	1500	5000
	F6	2000	3000	3000	3000	1000	3000	3000	10500
	F7	2000	3000	3000	3000	1000	3000	3000	10500
	F8	2000	3000	3000	3000	1000	3000	3000	10500
	M0	2500	3500	2500	2500	1600	2500	3500	4000
23	M1	20	13	15	7	8	18	260	100
	M2	280	280	280	280	570	280	760	350
1039	M3	1040	1040	1040	1040	1890	1040	155	78
	M4	150	150	150	150	83	150	1000	2000
	M5	400	400	400	400	1000	400	400	400
	M8	899	899	899	899	9999	9999	1099	1299
	R9	10.000	10.000	20.000	20.000	10.000	20.000	10.000	15.000
5000	S0	4000	6300	2500	4000	4000	2200	4000	3800
	S1	150	150	150	150	150	80	10	10
5000	S2	4000	6300	2500	4000	4000	2200	4000	3800
	S3	2000	2000	2000	2000	5000	2000	2000	2400
	S4	2000	2000	2000	2000	5000	2000	2000	2400
	S5	2000	2000	2000	2000	5000	2000	2000	2400
127	S7	20	20628	20	20628	20	20628	20618	20618

The value for parameters M1, M2, M3 are standard values and must be adjusted individually to each machine.