



CNC SYSTEM 20

Installation documentation

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1. DESCRIPTION

High performance CNC developed to provide outstanding speed, precision and efficiency demanded to accomplish the machining of the feature and all in a compact machine configuration. CNC designed for numerical control of lathes and turning centers, milling, drilling, boring machines, laser/oxygen machines (with tracking system) and machining centers.



Set contains:

- Computer numerical control for 3 axis (up to 6*) and spindle, PLC (1)
- Display 8.4" TFT SVGA (or 17" TFT*) and system keyboard (2)
- Machine panel with up to 55 buttons / 55 leds, hand wheel, Emergency Stop button (3)
- I/O module 40 optoisolated inputs and 24 relay outputs (4)
- Remote panel with hand wheel* (5)

* Option

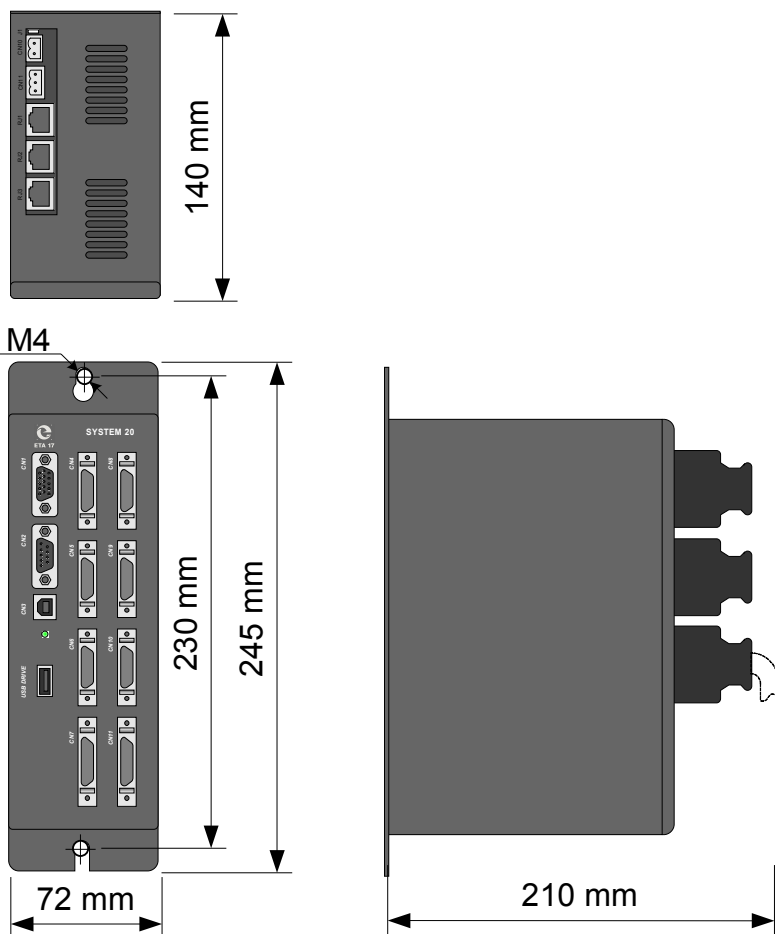
2. TECHNICAL DATA

CNC		
Characteristics	Account	Option
Controlled axis	3 (+ spindle without encoder)	Up to 6
Least increment	0.001mm / 0.0001 inch	
Interpolation	Linear, circular, helical	
Program	ISO	
Refresh time / interpolation	125µs / 4 ms	
Max dimension of motion	±9999.999	±99999.999
Max rapid traverse	32 m/min	64 m/min
Max feed rate	32 m/min	64 m/min
Program memory	64KB in RAM, 60MB in Flash	
Graphics	2D / 3D	
Diagnostics	Yes	
Alarm history	Yes	
Work history	Yes	
Input/output of programs, parameters etc.	RS232C isolated, USB isolated	USB drive
DNC	Yes	
Display	8.4" TFT SVGA	17" TFT SVGA
Integrated programmable controller		
Program language	PMCX	Ladder editor
Visualization	On display	
Execution time	5µs / instruction	
Periphery		
Inputs / outputs	40 optoisolated / 24 relay	Up to 120 inputs / 72 outputs
Analog inputs	4 (12 bits), 2 (8 bits)	+4 (12 bits)
Analog outputs	1 (13 bits + sign)	+1
Machine panel	55 buttons and leds, hand wheel, ESP button	
Remote machine panel	Switch for axis, switch for step, hand wheel, ESP button	

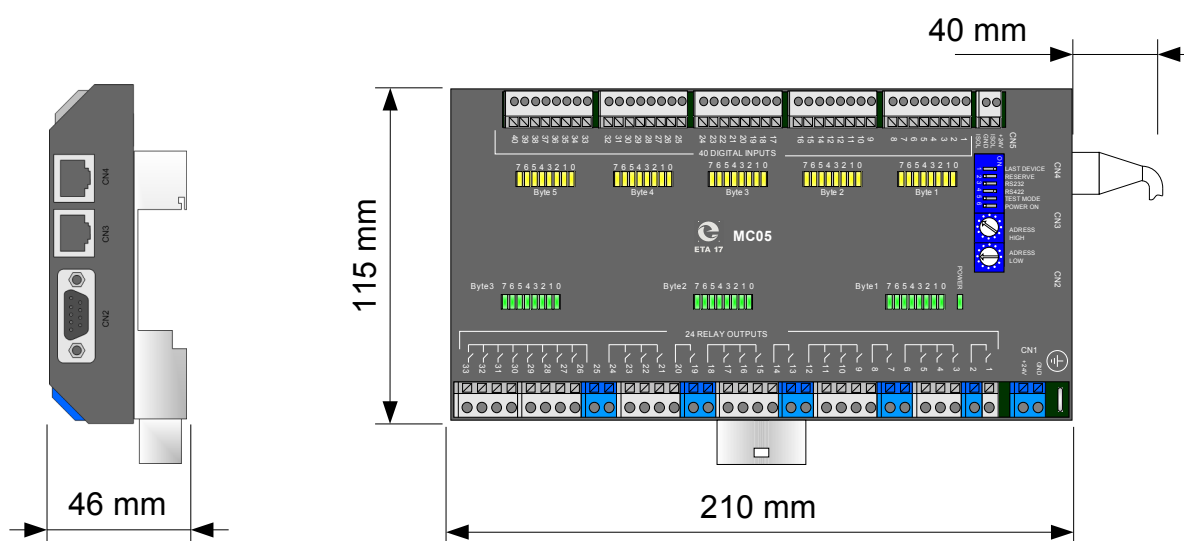
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3. MOUNTING DIMENSIONS

3.1. CNC

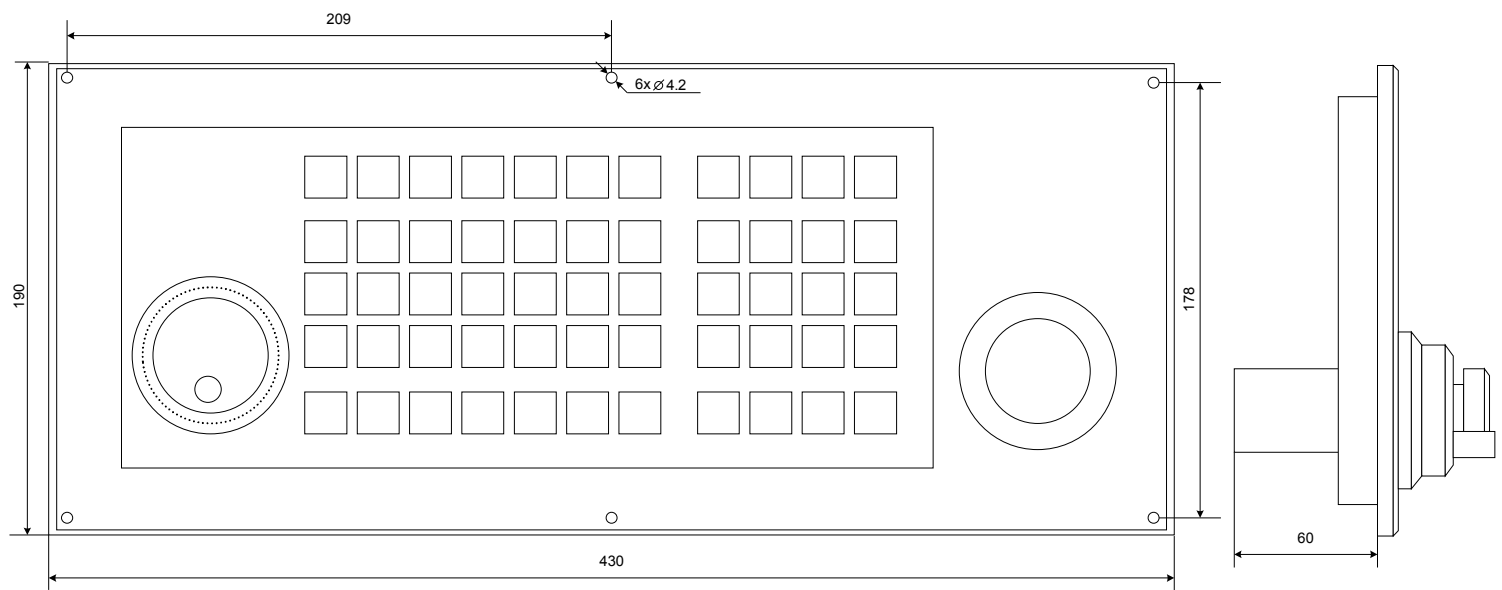


3.2. Input / Output module (MC05)

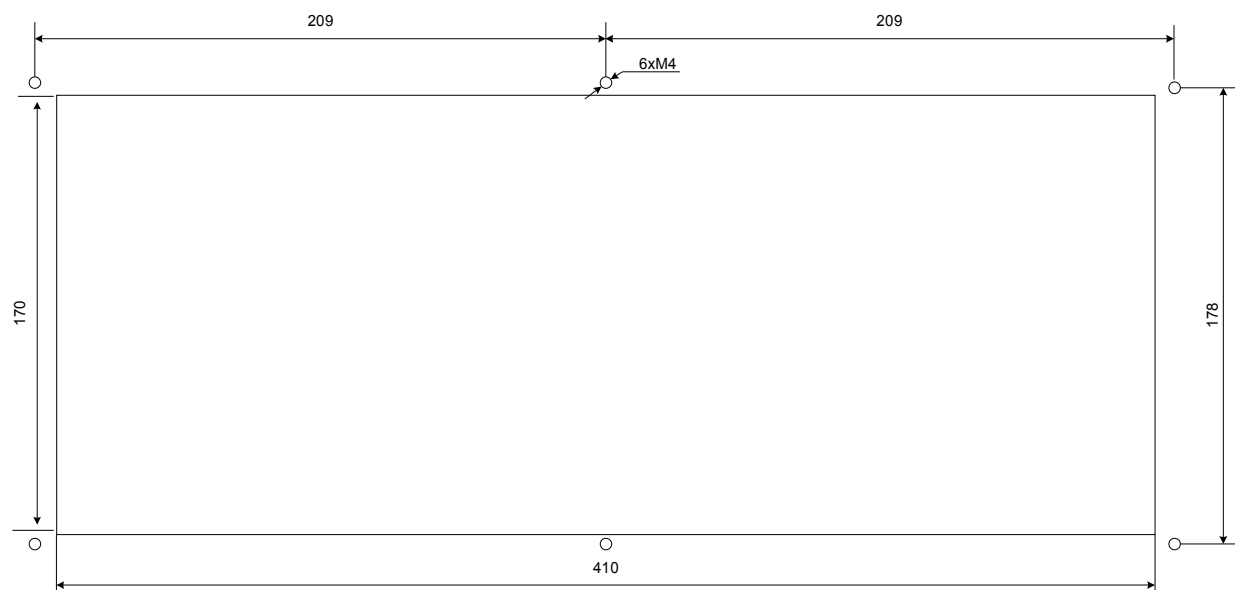


3. MOUNTING DIMENSIONS

3.3. Machine panel (MP09)



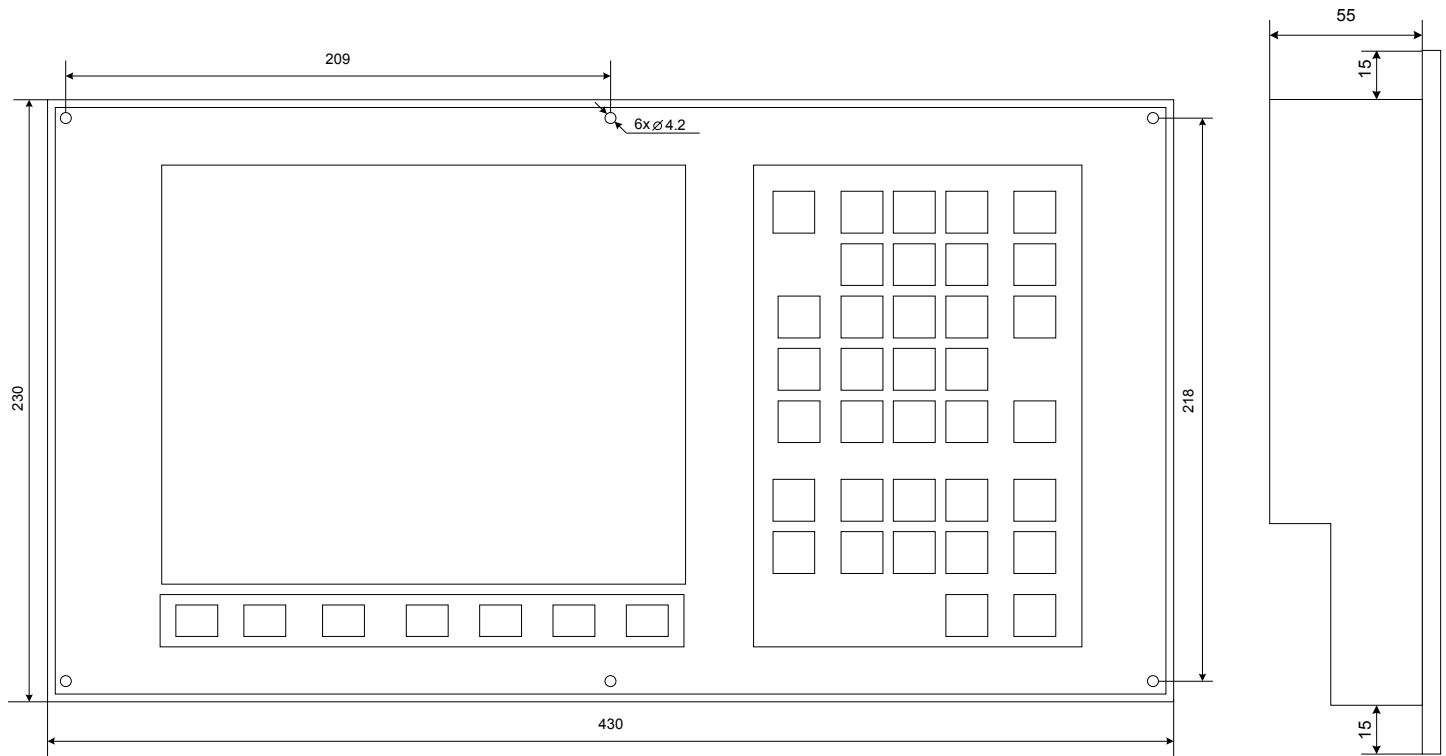
Cutout



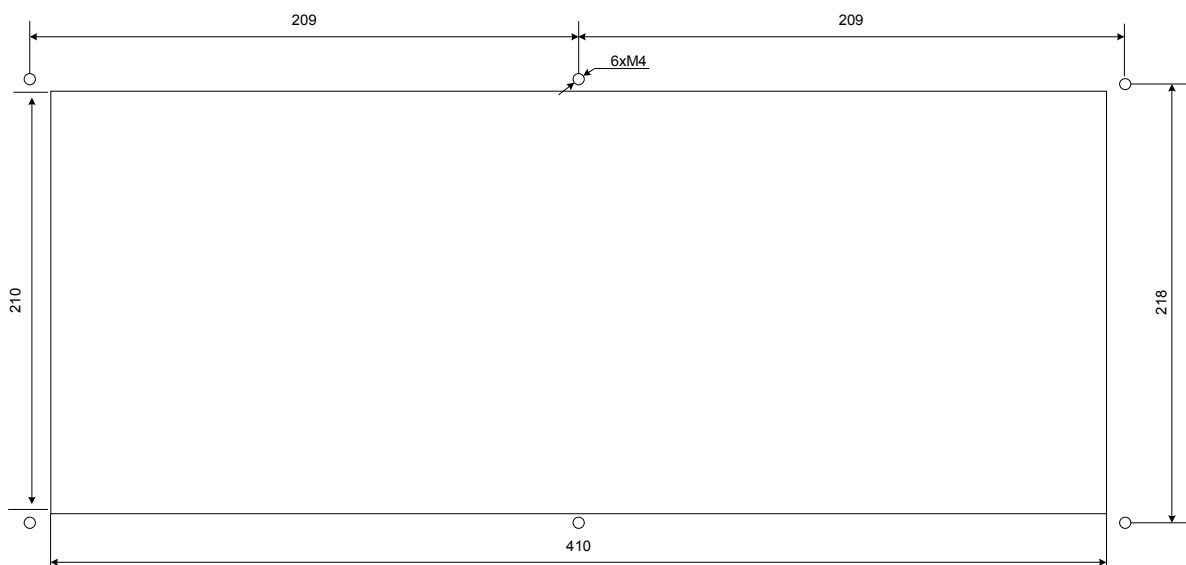
All dimensions are in mm

3. MOUNTING DIMENSIONS

3.4. Display and keyboard (TFT 8.4")



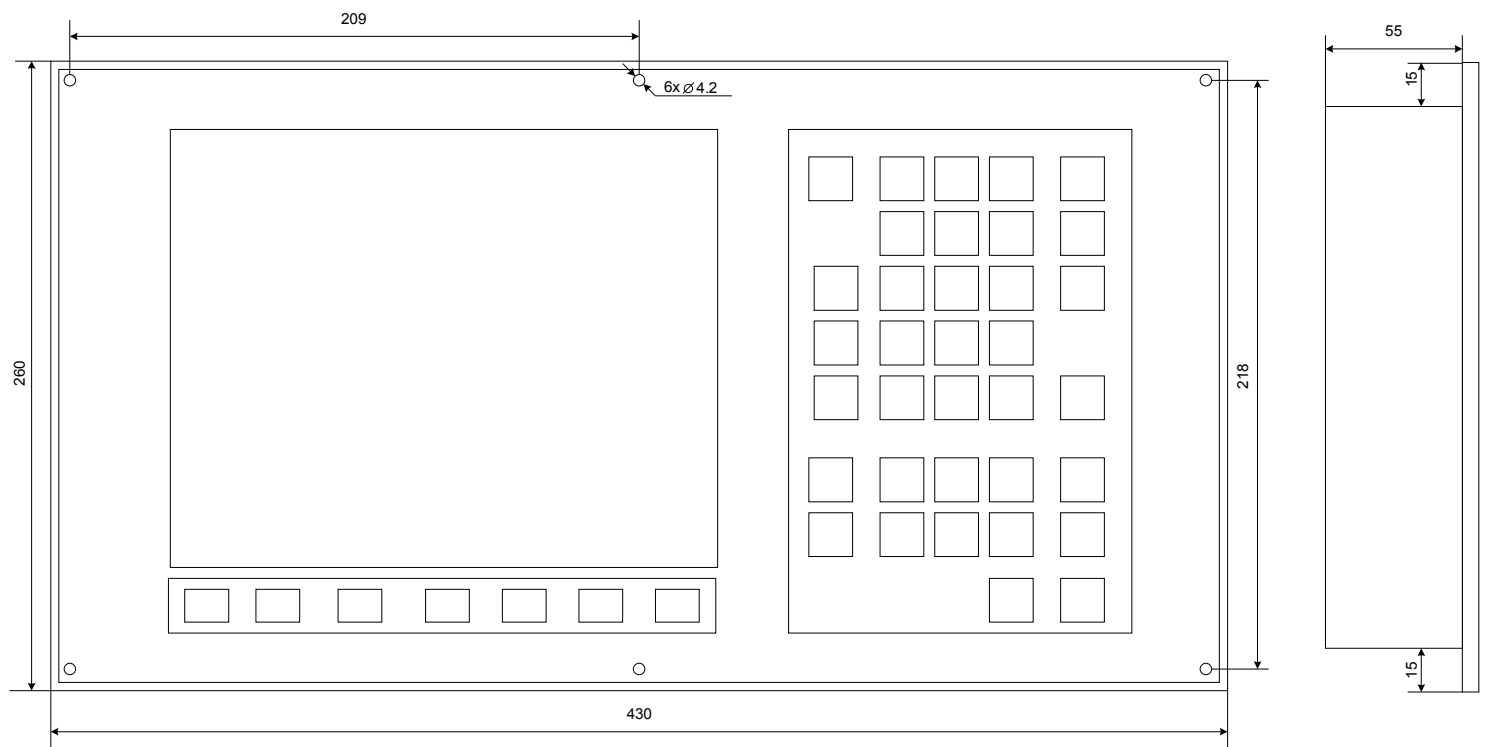
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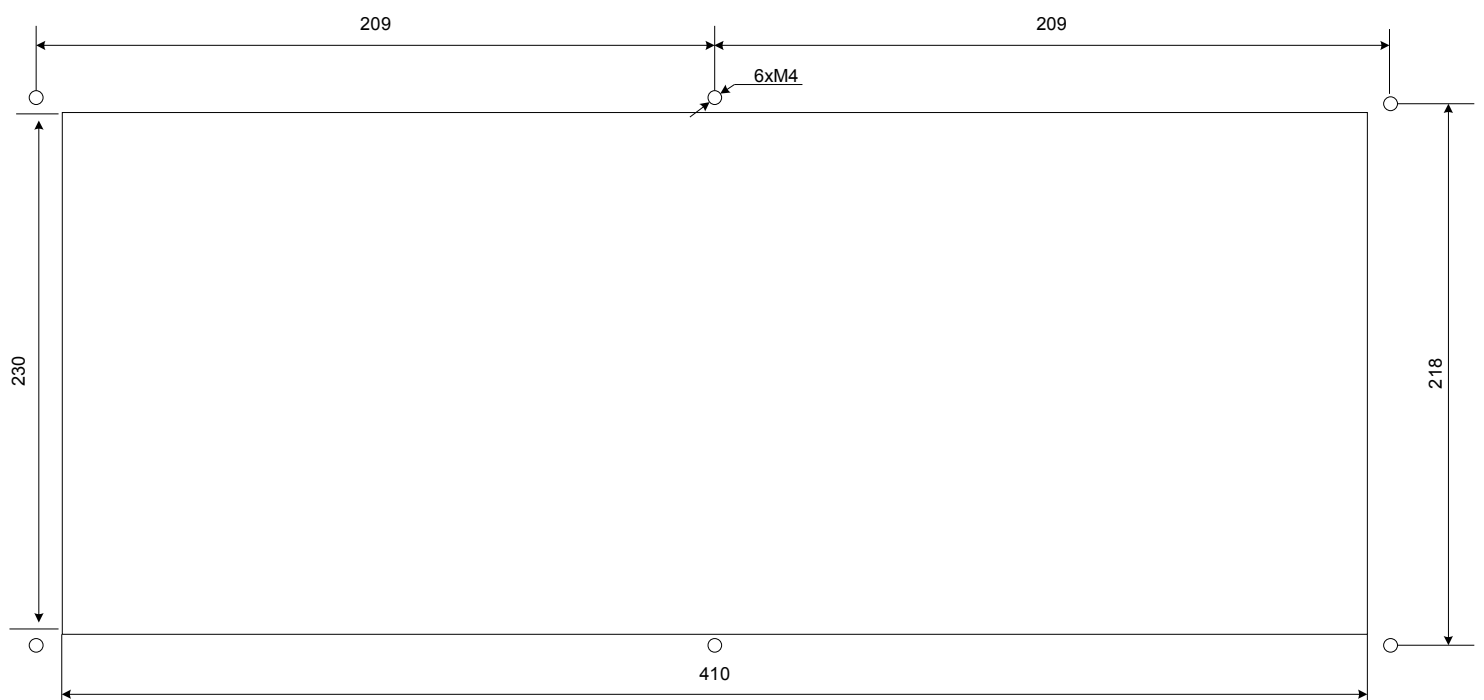
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3. MOUNTING DIMENSIONS

3.5. Display and keyboard (TFT 10“)

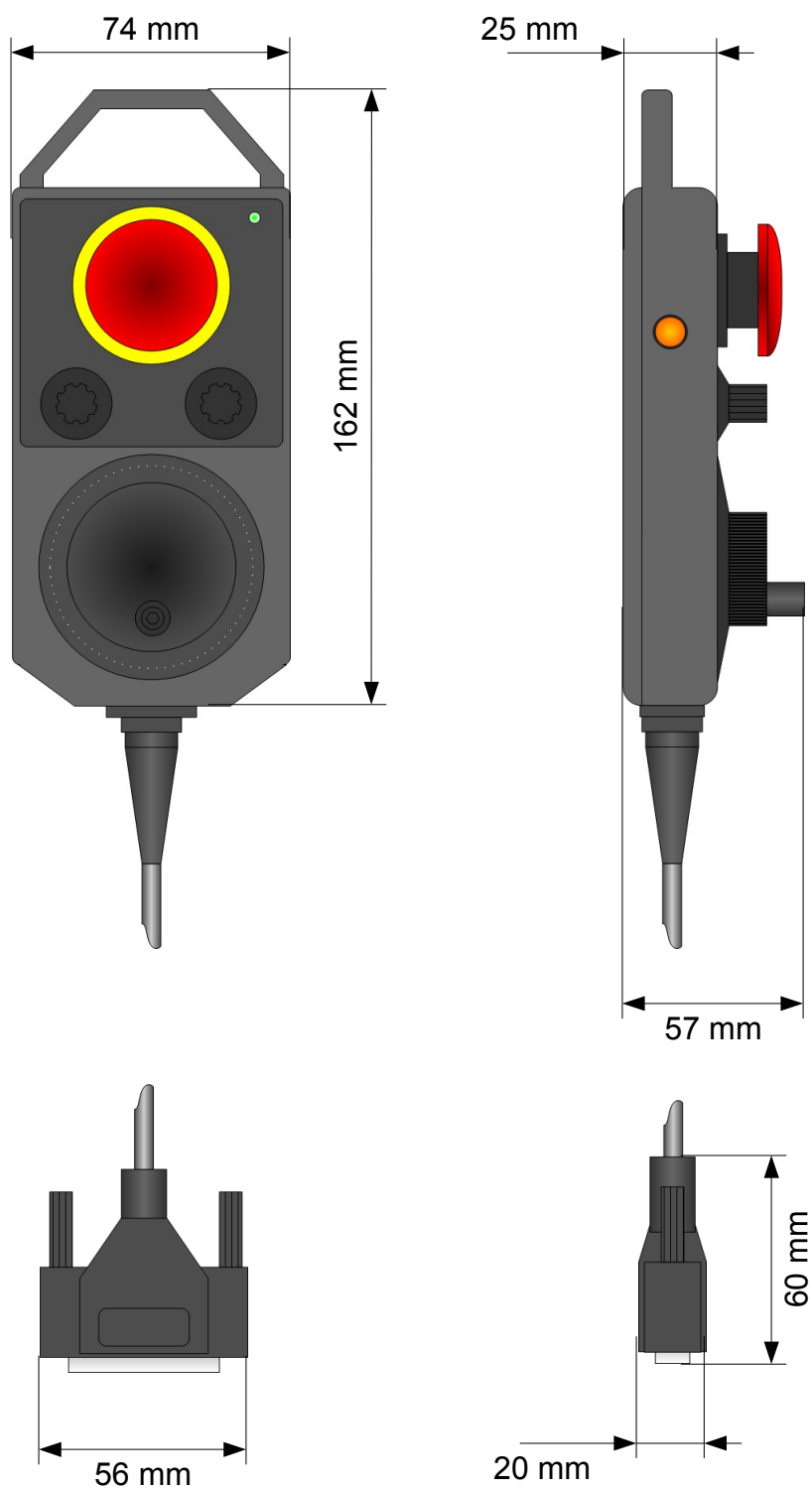


Cutout



All dimensions are in mm

3.6. Remote machine panel

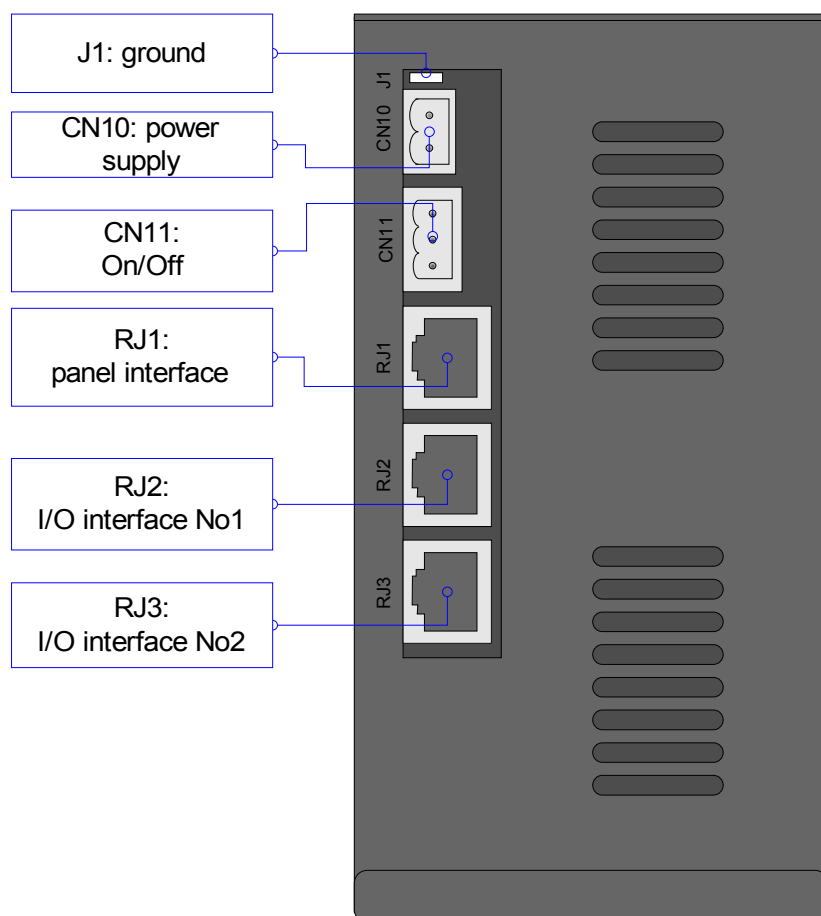


4.1. CNC:

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4. CONNECTORS DESCRIPTION

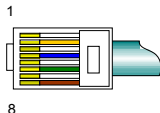
4.1.1. CNC: Power supply, ON/OFF, serial interface Machine panel and I/O module

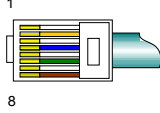


J1			
Pin	Signal	Description	Connector
1	PE	Ground	

CN12			
Pin	Signal	Description	Connector
1	+24V DC	Power supply	
2	GND	- -	

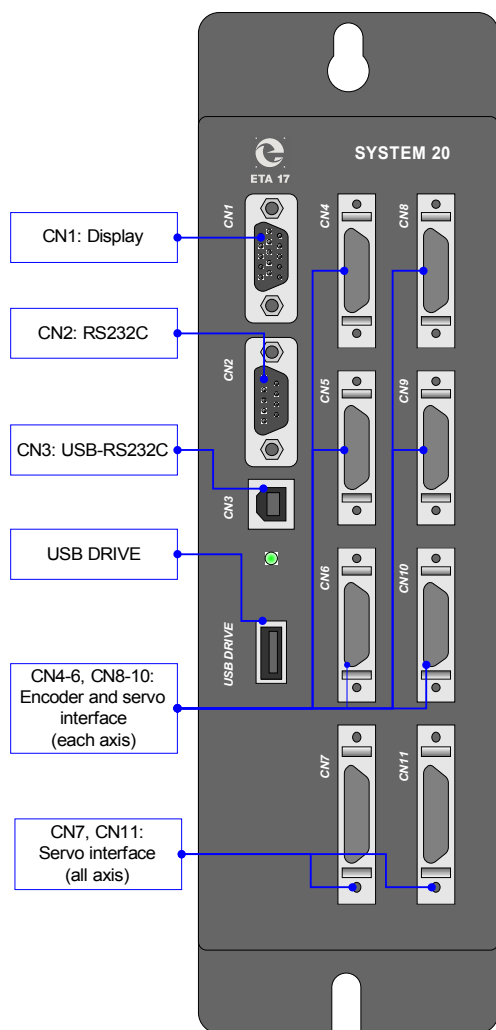
CN13			
Pin	Signal	Description	Connector
1	Off	On/Off	
2	On	- -	
3	Com	- -	

RJ1			
Pin	Signal	Description	Connector
1	Tx+	Data	
2	Tx-	- -	
3	Rx+	- -	
4	Key	Key input	
5	*ESP	ESP input	
6	Rx-	Data	
7	ON_A	On panel	
8	GND	0V	

RJ2, RJ3			
Pin	Signal	Description	Connector
1	Tx+	Data	
2	Tx-	- -	
3	Rx+	- -	
4	-	-	
5	-	-	
6	Rx-	Data	
7	ON_B	On I/O	

4. CONNECTORS DESCRIPTION

4.1.2. CNC: Display, RS232C, USB-RS232C



CN1 – display			
Pin	Signal	Description	Connector (solder side)
1	Red	Analog color	HD15 MALE
2	Green	- -	
3	Blue	- -	
4	-	-	
5	GND	0V	
6	GND	- -	
7	GND	- -	
8	GND	- -	
9	-	-	
10	GND	0V	
11	-	-	
12	-	-	
13	Hsync	Sync	
14	Vsync	Sync	
15	-	-	

CN2 – RS232C			
Pin	Signal	Description	Connector (solder side)
1	-	-	DB9 MALE
2	Rx	Serial data input	
3	Tx	Serial data output	
4	-	-	
5	GND	0V	
6	-	-	
7	-	-	
8	-	-	
9	-	-	

CN3 – USB-RS232C			
Pin	Signal	Description	Connector (USB – B)
1	Vbus	Power supply	
2	D-	Serial data	
3	D+	Serial data	
4	GND		

4. CONNECTORS DESCRIPTION

4.1.3. CNC: Encoder and servo interface (each axis)

CN4-6, CN8-10 – encoder and servo interface (each axis)				
Pin	Signal	Description	Type	Connector (solder side)
1	A	Input encoder		3M No: 10126 14 s_on_p16 s_rdy_p18 prdy_p20 s_alm_p22 VCMD24 OH_P26 +24V_i 15 s_on_n17 s_rdy_n19 prdy_n21 s_alm_n23 AGND25 OH_N 1 A3 B5 C7 GND9 pulse_p11 sign_p13 GND 2 *A4 *B6 *C8 +5V10 pulse_n12 sign_n
2	*A	- -		
3	B	- -		
4	*B	- -		
5	C	- -		
6	*C	- -		
7	GND	0V encoder		
8	+5V	Power supply encoder		
9	Pulse_P	Output Pulse I/F		
10	Pulse_N	- -		
11	Sign_P	- -		
12	Sign_N	- -		
13	GND	0V		
14	S_ON_P	Output Servo ON +		
15	S_ON_N	Output Servo ON -		
16	S_RDY_P	Input Servo Ready +		
17	S_RDY_N	Input Servo Ready -		
18	PRDY_P	Output PRDY +		
19	PRDY_N	Output PRDY -		
20	S_ALM_P	Input Servo Alarm +		
21	S_ALM_N	Input Servo Alarm -		
22	VCMD	Analog velocity command		
23	AGND	Analog ground		
24	OH_P	Input Motor Overheat +		
25	OH_N	Input Motor Overheat -		
26	+24V_i	Power supply		
Case	GND	Shield		

Notes:

For M system

CN4 – X axis

CN5 – Y axis

CN6 – Z axis

CN8, CN9 and CN10 may be configured as axis, or spindle with encoder feedback

In case of 3 axis system, spindle can be configured as DAC without feedback on CN7 like DAC1.

In case of 6 axis system, spindle can be configured as DAC on CN7 (DAC1) or CN11 (DAC2) without encoder feedback.

For T system

CN4 – X axis

CN5 – Z axis

CN6 – spindle with encoder or C axis (if C axis is needed, spindle is configured on CN8)

4. CONNECTORS DESCRIPTION

4.1.4. CNC: Servo interface (all axis)

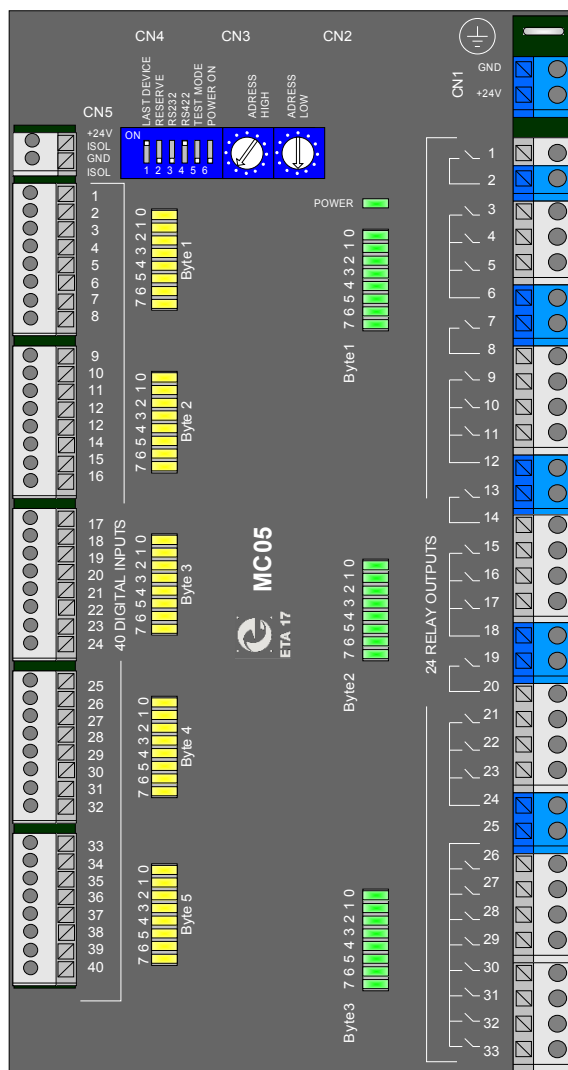
CN7 / CN11 – servo interface (all axis)				Conector (solder side)
Pin	Signal	Description	Type	
1	VCMD1 / 4	Analog command axis 1 / 4	DAC	3M No: 10136 CN7 CN11
2	AGND	Analog ground		
3	TS1 / 4	Tacho signal axis 1 / 4		
4	S_ON_P1 / 4	Output Servo ON + axis 1 / 4		
5	S_ON_N1 / 4	Output Servo ON – axis 1 / 4		
6	S_RDY_P1 / 4	Input Servo Ready + oc 1 / 4		
7	S_RDY_N1 / 4	Input Servo Ready – oc 1 / 4		
8	VCMD2 / 5	Analog command axis 2 / 5	DAC	
9	AGND	Analog ground		
10	TS2 / 5	Tacho signal axis 2 / 5		
11	S_ON_P2 / 5	Output Servo ON + oc 2 / 5		
12	S_ON_N2 / 5	Output Servo ON – oc 2 / 5		
13	S_RDY_P2 / 5	Input Servo Ready + oc 2 / 5		
14	S_RDY_N2 / 5	Input Servo Ready – oc 2 / 5		
15	VCMD3 / 6	Analog command axis 3 / 5	DAC	
16	AGND	Analog ground		
17	TS3 / 6	Tacho signal axis 3 / 5		
18	GND	0 V		
19	S_ON_P3 / 6	Output Servo ON + oc 3 / 6		
20	S_ON_N3 / 6	Output Servo ON – oc 3 / 6		
21	S_RDY_P3 / 6	Input Servo Ready + oc 3 / 6		
22	S_RDY_N3 / 6	Input Servo Ready - oc 3 / 6		
23	VCMD7/8	Analog command DAC 1 / 2	DAC	
24	AGND	Analog ground		
25	S_ON_P7 / 8	Output Servo ON + DAC 1 / 2		
26	S_ON_N7 / 8	Output Servo ON – DAC 1 / 2		
27	S_RDY_P7 / 8	Input Servo Ready + ЦАП 1 / 2		
28	S_RDY_N7 / 8	Input Servo Ready - DAC 1 / 2		
29	A_IN_1 / 5	ADC Input 1 / 5	ADC	
30	A_IN_2 / 6	ADC Input 2 / 6	ADC	
31	A_IN_3 / 7	ADC Input 3 / 7	ADC	
32	A_IN_4 / 8	ADC Input 4 / 8	ADC	
33	PNP_1 / 3	PNP Input 1 / 3		
34	PNP_N	PNP Inputs ground		
35	PNP_2 / 4	PNP Input 2 / 4		
36	+12V	12V 100mA		

4. CONNECTORS DESCRIPTION

4.2. I/O module MC05

Pin	Signal	Description	Connector
1	+24V isol	Power supply	
2	GND isol	- -	

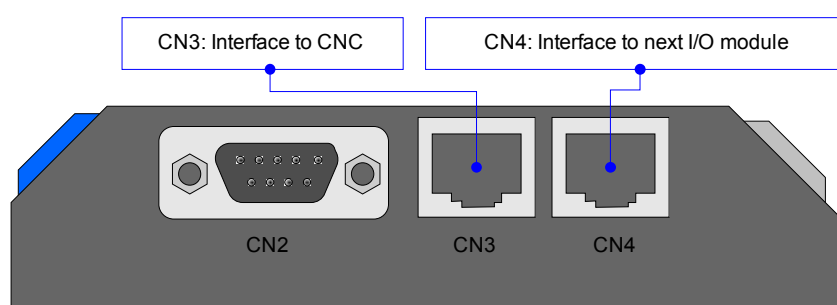
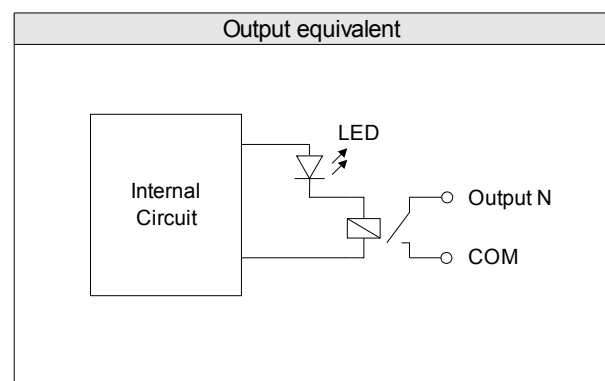
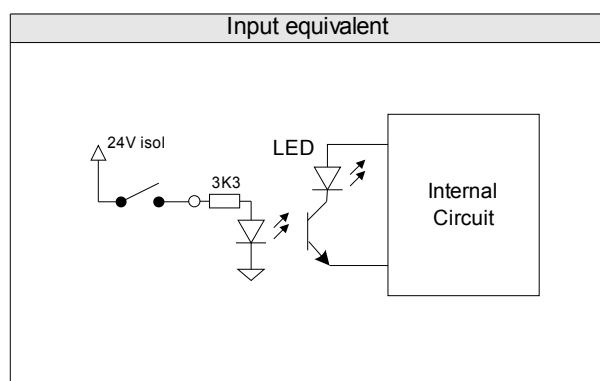
Pin	Signal	Type	DGN BIT	DGN BYTE
1	DI0		0	8 16 24
2	DI1		1	8 16 24
3	DI2		2	8 16 24
4	DI3		3	8 16 24
5	DI4		4	8 16 24
6	DI5		5	8 16 24
7	DI6		6	8 16 24
8	DI7		7	8 16 24
9	DI10		0	9 17 25
10	DI11		1	9 17 25
11	DI12		2	9 17 25
12	DI13		3	9 17 25
13	DI14		4	9 17 25
14	DI15		5	9 17 25
15	DI16		6	9 17 25
16	DI17		7	9 17 25
17	DI20		0	10 18 26
18	DI21		1	10 18 26
19	DI22		2	10 18 26
20	DI23		3	10 18 26
21	DI24		4	10 18 26
22	DI25		5	10 18 26
23	DI26		6	10 18 26
24	DI27		7	10 18 26
25	DI30		0	11 19 27
26	DI31		1	11 19 27
27	DI32		2	11 19 27
28	DI33		3	11 19 27
29	DI34		4	11 19 27
30	DI35		5	11 19 27
31	DI36		6	11 19 27
32	DI37		7	11 19 27
33	DI40		0	12 20 28
34	DI41		1	12 20 28
35	DI42		2	12 20 28
36	DI43		3	12 20 28
37	DI44		4	12 20 28
38	DI45		5	12 20 28
39	DI46		6	12 20 28
40	DI47		7	12 20 28



Pin	Signal	Description	Connector
1	PE	Ground	

Pin	Signal	Description	Connector
2	GND	Power supply	
1	+24V DC	- -	

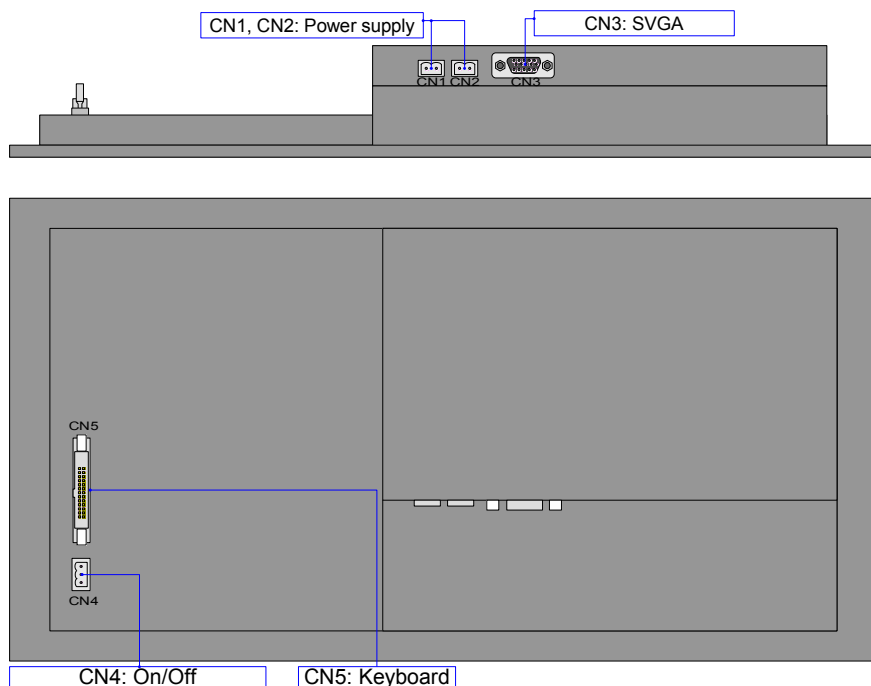
Pin	Signal	Type	DGN BIT	DGN BYTE
1	DO0		0	52 60 68
2	COM_DO0			
3	DO1		1	52 60 68
4	DO2		2	52 60 68
5	DO3		3	52 60 68
6	COM0L			
7	COM_DO4			
8	DO4		4	52 60 68
9	DO5		5	52 60 68
10	DO6		6	52 60 68
11	DO7		7	52 60 68
12	COM0H			
13	COM_DO10			
14	DO10		0	53 61 69
15	DO11		1	53 61 69
16	DO12		2	53 61 69
17	DO13		3	53 61 69
18	COM1L			
19	COM_DO14			
20	DO14		4	53 61 69
21	DO15		5	53 61 69
22	DO16		6	53 61 69
23	DO17		7	53 61 69
24	COM1H			
25	COM2			
26	DO20		0	54 62 70
27	DO21		1	54 62 70
28	DO22		2	54 62 70
29	DO23		3	54 62 70
30	DO24		4	54 62 70
31	DO25		5	54 62 70
32	DO26		6	54 62 70
33	DO27		7	54 62 70



Pin	Signal	Description	Connector
1	Rx+	Data	
2	Rx-	- -	
3	Tx+	- -	
4	-	-	
5	-	-	
6	Tx-	Data	
7	ON_B	On – module	
8	GND	0V	

4. CONNECTORS DESCRIPTION

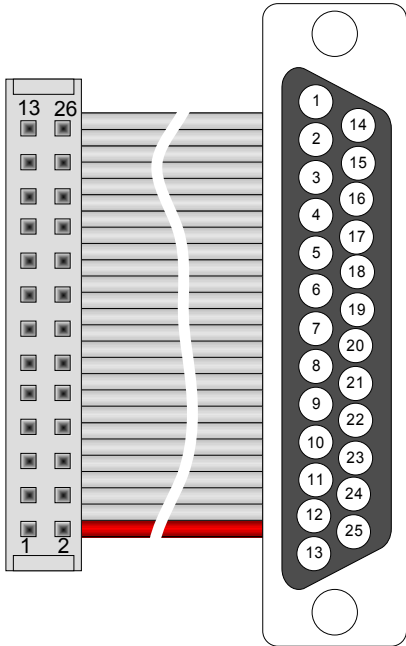
4.3. Display and keyboard



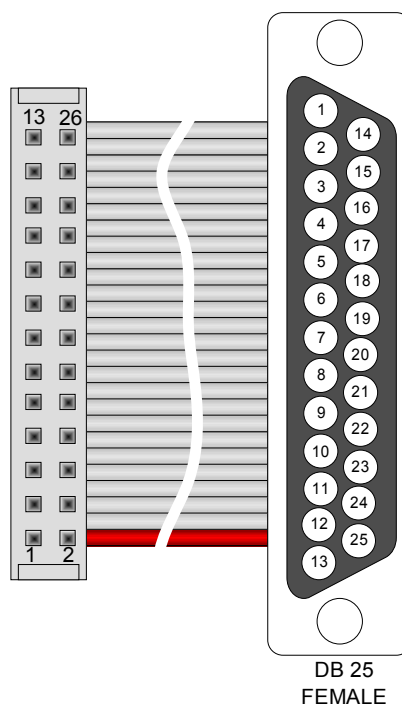
CN1, CN2 : Захранване			
Pin	Сигнал	Описание	Конектор
1	+24V DC	Захранване	1
2	GND	- -	

CN3 – SVGA signal			
Pin	Signal	Description	Connector (solder side)
1	Red	Analog color	
2	Green	- -	
3	Blue	- -	
4	-	-	
5	GND	Ground	
6	GND	- -	
7	GND	- -	
8	GND	- -	
9	-	-	
10	GND	Ground	
11	-	-	
12	-	-	
13	Hsync	Sync	
14	Vsync	Sync	
15	-	-	

CN4: On / Off			
Pin	Signal	Description	Connector
1	Off	Off	1
2	On	On	
3	Com	Common	

CN5 – Keyboard			
Pin	Signal	Cable 26 IDC – DB25F	Pin
1	GND		13
2	GND		25
3	+24V		12
4	+24V		24
5	-		11
6	-		23
7	*SWK7		10
8	*SWK6		22
9	*SWK5		9
10	*SWK4		21
11	*SWK3		8
12	*SWK2		20
13	*SWK1		7
14	*SWK0		19
15	-		6
16	-		18
17	-		5
18	*CMK7		17
19	*CMK6		4
20	*CMK5		16
21	*CMK4		3
22	*CMK3		15
23	*CMK2		2
24	*CMK1		14
25	*CMK0		1
26	-		

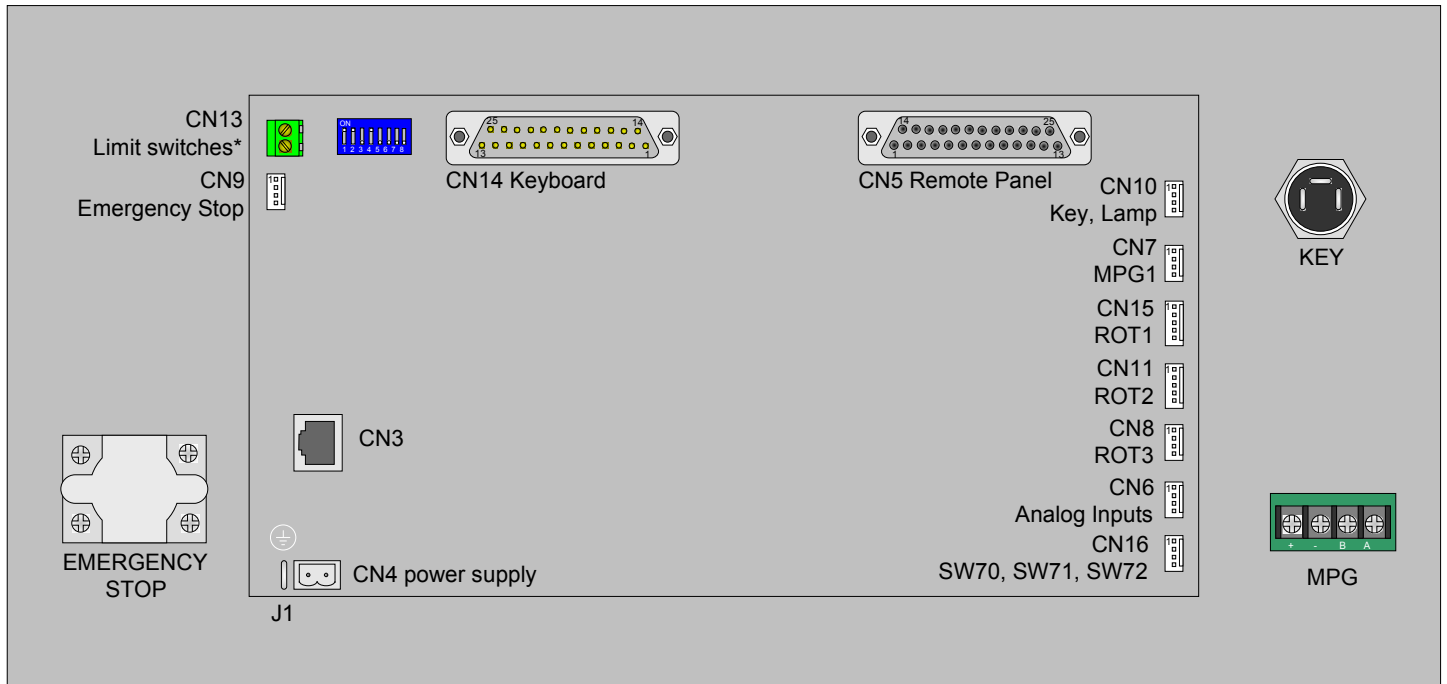
View from connectors side



View from connectors side

4. CONNECTORS DESCRIPTION

4.4. Machine panel MP09



J1 – ground			
Pin	Signal	Description	Connector
1	PE	Ground	

CN4 – Power supply			
Pin	Signal	Description	Connector
1	+24V DC	Power supply	
2	GND	- -	

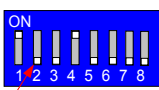
CN3 – interface to CNC			
Pin	Signal	Description	Connector
1	Rx+	Data	
2	Rx-	- -	
3	Tx+	- -	
4	Key	Key	
5	*ESP	Emergency	
6	Tx-	Data	
7	ON_A	On signal	
8	GND	0V	

CN9 – Emergency Stop			
Pin	Signal	Description	Connector
1	ESP_NC1	Normally closed	
2	ESP_NC2	Normally Closed	
3	ESP_NO1	Normally opened	
4	ESP_NO2	Normally opened	

CN13 – Limit switches (option)			
Pin	Signal	Description	Connector
1	LS_NC1	Normally closed	
2	LS_NC2	Normally closed	

Note:

When limit switches input is used sw.2 must be set to OFF!



CN10 – Key, Lamp			
Pin	Signal	Description	Connector
1	Key1	Key	
2	Key2	Key	
3	+24V	Lamp	
4	GND	0V	

CN7 – Handwheel			
Pin	Signal	Description	Connector
1	VCC	Pwr. Supply	
2	GND	0V	
3	HB	Input B	
4	HA	Input A	

CN15, CN11 – ROT1, ROT2 (Rotary whitches)			
Pin	Signal	Description	Connector
1	8	Bit 3	
2	4	Bit 2	
3	2	Bit 1	
4	1	Bit 0	
5	COM	0V	

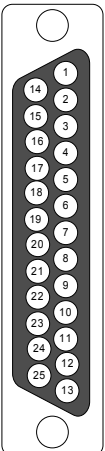
CN8 – ROT3 (Rotary switch)			
Pin	Signal	Description	Connector
1	4	Bit 2	
2	2	Bit 1	
3	1	Bit 0	
4	COM	0V	

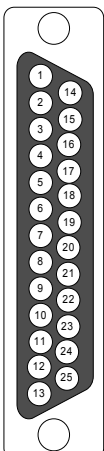
CN6 – Analog inputs (8 bits)			
Pin	Signal	Description	Connector
1	VCC	+3V	
2	ADC2	Input 1	
3	ADC3	Input 2	
4	GND	0V	

CN16 – External buttons			
Pin	Signal	Description	Connector
1	SW70	Button 0	
2	SW71	Button 1	
3	SW72	Button 2	
4	COM	Common	

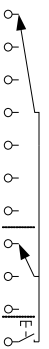
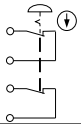
4. CONNECTORS DESCRIPTION

4.4. Machine panel MP09 (cont.)

CN14 – Keyboard			
Pin	Signal	Description	Connector (solder side)
1	*CMK0	Column	 DB 25 FEMALE
2	*CMK2	- -	
3	*CMK4	- -	
4	*CMK6	- -	
5	-	-	
6	-	-	
7	*SWK1	Row	
8	*SWK3	- -	
9	*SWK5	- -	
10	*SWK7	- -	
11	-	-	
12	+24V	Pwr. Supply	
13	GND	0V	
14	*CMK1	Column	
15	*CMK3	- -	
16	*CMK5	- -	
17	*CMK7	- -	
18	-	-	
19	*SWK0	Row	
20	*SWK2	- -	
21	*SWK4	- -	
22	*SWK6	- -	
23	-	-	
24	+24V	Pwr. Supply	
25	GND	0V	

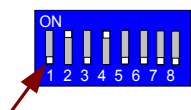
CN5 – Remote panel			
Pin	Signal	Description	Connector (solder side)
1	GND	0V	 DB 25 MALE
2	GND	0V	
3	HA3	Input HW 3	
4	+5V	Power supply HW	
5	+24V	-	
6	+24V	-	
7	MPG_X10	Step x 10	
8	-	-	
9	GND	0V	
10	A_6	Axis 6	
11	A_4	Axis 4	
12	A_Y	Axis Y	
13	OFF	No axis is selected	
14	GND	0V	
15	HB3	Input HW 3	
16	+5V	Power supply HW	
17	NC12	Internal ESP	
18	NC11 (+24V)	- -	
19	MPG_X100	Step x 100	
20	MPG_X1	Step x 1	
21	GND	0V	
22	ESP2_NC2	Ext. ESP	
23	A_5	Axis 5	
24	A_Z	Axis Z	
25	A_X	Axis X	

4.5. Remote panel

Cable – remote panel		
Signal	Description	Schematic
OFF	No axis selected	
X	X axis	
Y	Y axis	
Z	Z axis	
4	4 axis	
5	5 axis	
6	6 axis	
X1	Step x1	
X10	Step x10	
X100	Step x100	
COM	Common (0V)	
24V	Led +	
0V LED	Led -	
NC1	ESP NC 1	
NC1	ESP NC 1	
NC2	ESP NC2	
NC2	ESP NC2	
VCC	Pwr. Supply HW	
0V	0V HW	
A	Input A	

Note:

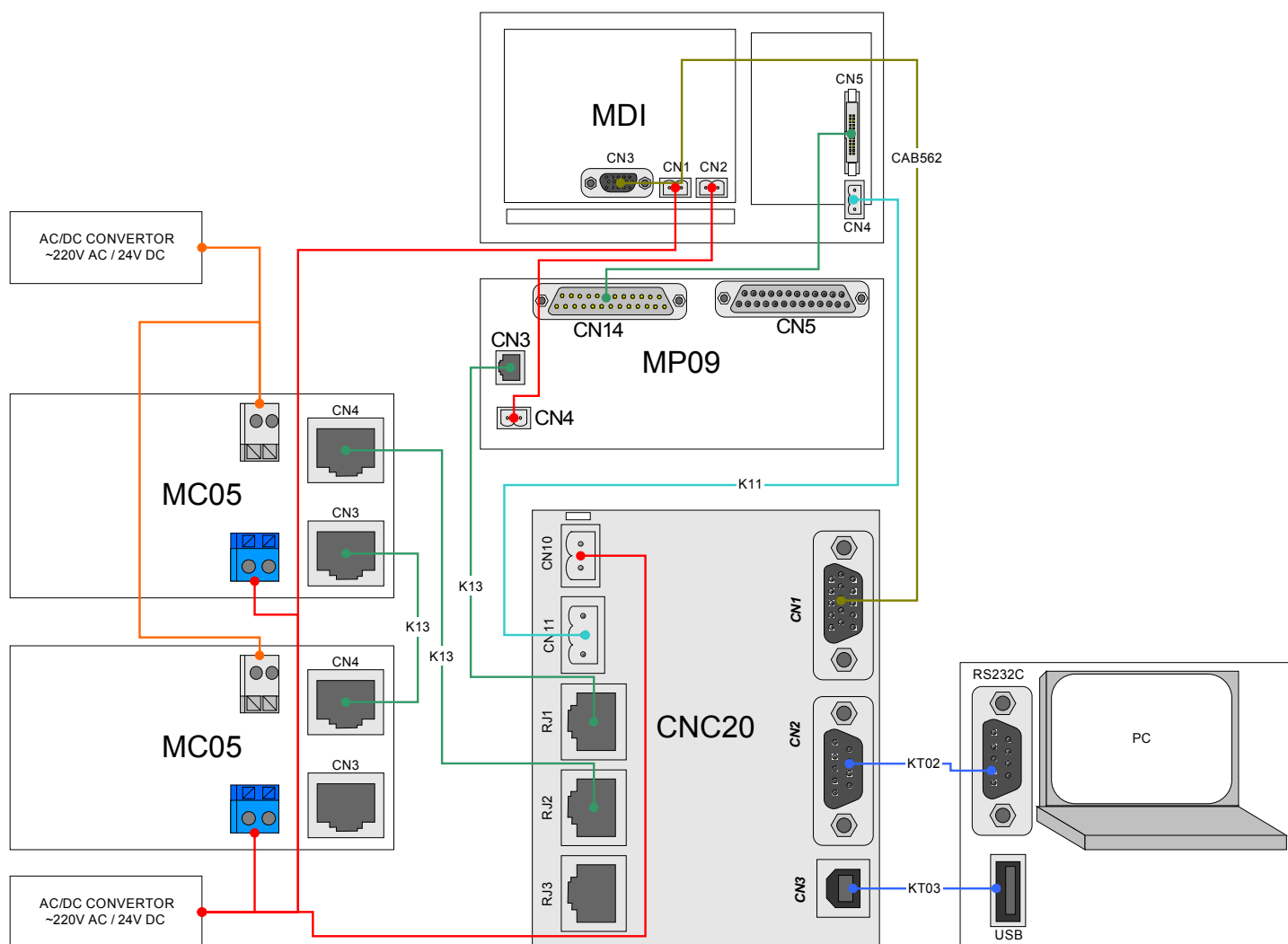
When remote panel is used, sw.1 must be set to OFF!



5.1. Connecting CNC with display, machine panel, I/O modules and PC	20
5.2. Connecting Feedback (encoders)	21
5.3. Connecting Servodrives	23

5. CONNECTING

5.1. Connecting CNC with display, machine panel, I/O module and PC



K13: cable CNC – machine panel and I/O module

CNC		Connectors	Panel (I/O модуль)	
Pin	Signal	RJ45 – RJ45	Pin	Signal
1	Tx+		1	Rx+
2	Tx-		2	Rx-
3	Rx+		3	Tx+
4	KEY (-)		4	KEY (-)
5	ESP (-)		5	ESP (-)
6	Rx-		6	Tx-
7	ON_A (ON_B)		7	ON_A (ON_B)
8	GND		8	GND

KT02: cable CNC – RS232C (PC)

CNC		Connectors	PC (RS232)	
Pin	Signal	D9M <--> D9F	Pin	Signal
2	RxD		3	TxD
3	TxD		2	RxD
5	GND		5	GND

K11: cable CNC – ON/OFF

CNC		Connectors	Keyboard	
Pin	Signal	WAGO: 231-103 <--> 231-103	Pin	Signal
1	Off		1	Off
2	On		2	On
3	Com		3	Com

KT03: cable CNC – USB (PC)

CNC		Connectors	PC (USB)	
Pin	Signal	USB-B <--> USB-A	Pin	Signal
1	Vbus		1	Vbus
2	D-		2	D-
3	D+		3	D+
4	GND		4	GND

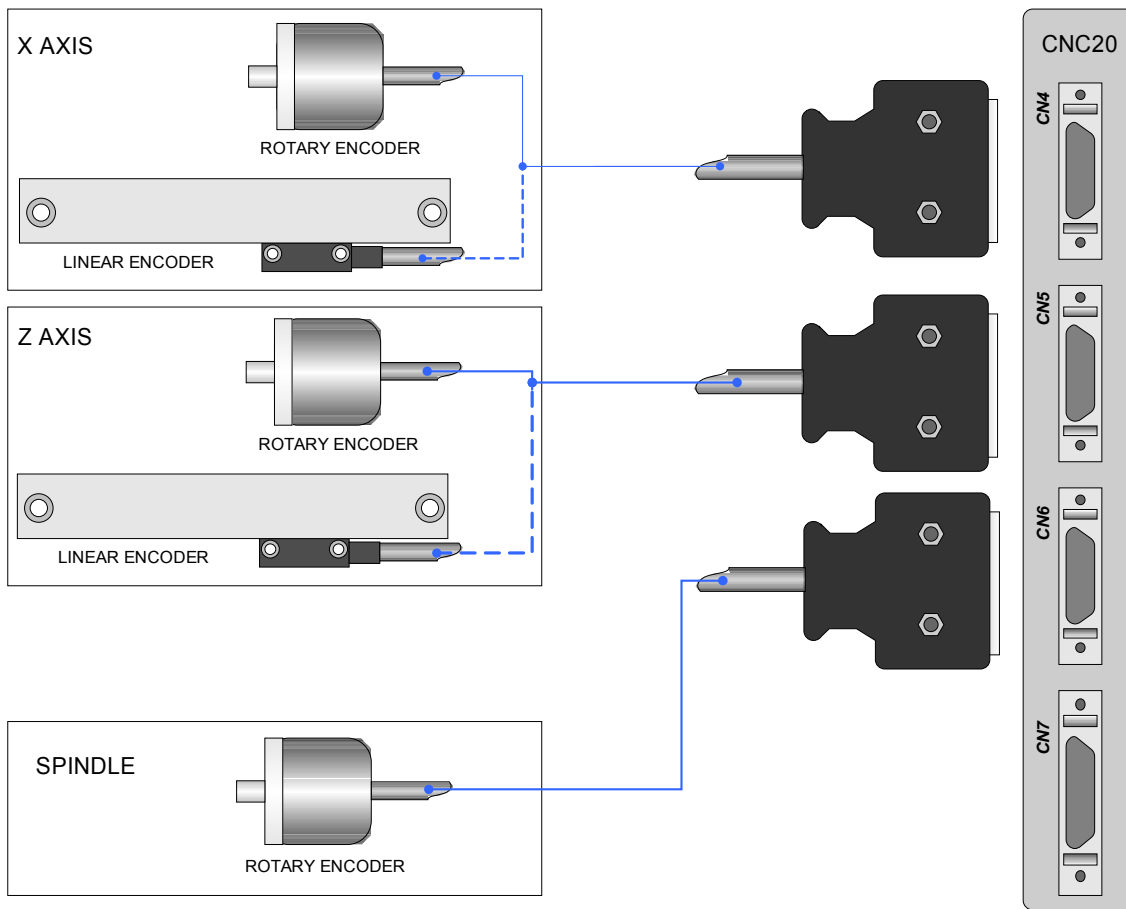
CAB562: cable CNC – Display

CNC		Connectors	Display	
Pin	Signal	HD15M <--> HD15F	Pin	Signal
1	RED		1	RED
2	GREEN		2	GREEN
3	BLUE		3	BLUE
5	GND		5	GND
6	GND		6	GND
7	GND		7	GND
10	GND		10	GND
13	HSYNC		13	HSYNC
14	VSNC		14	VSNC

5. CONNECTING

5.2. Connecting CNC with encoders

5.2.1. Lathe (X, Z, spindle)



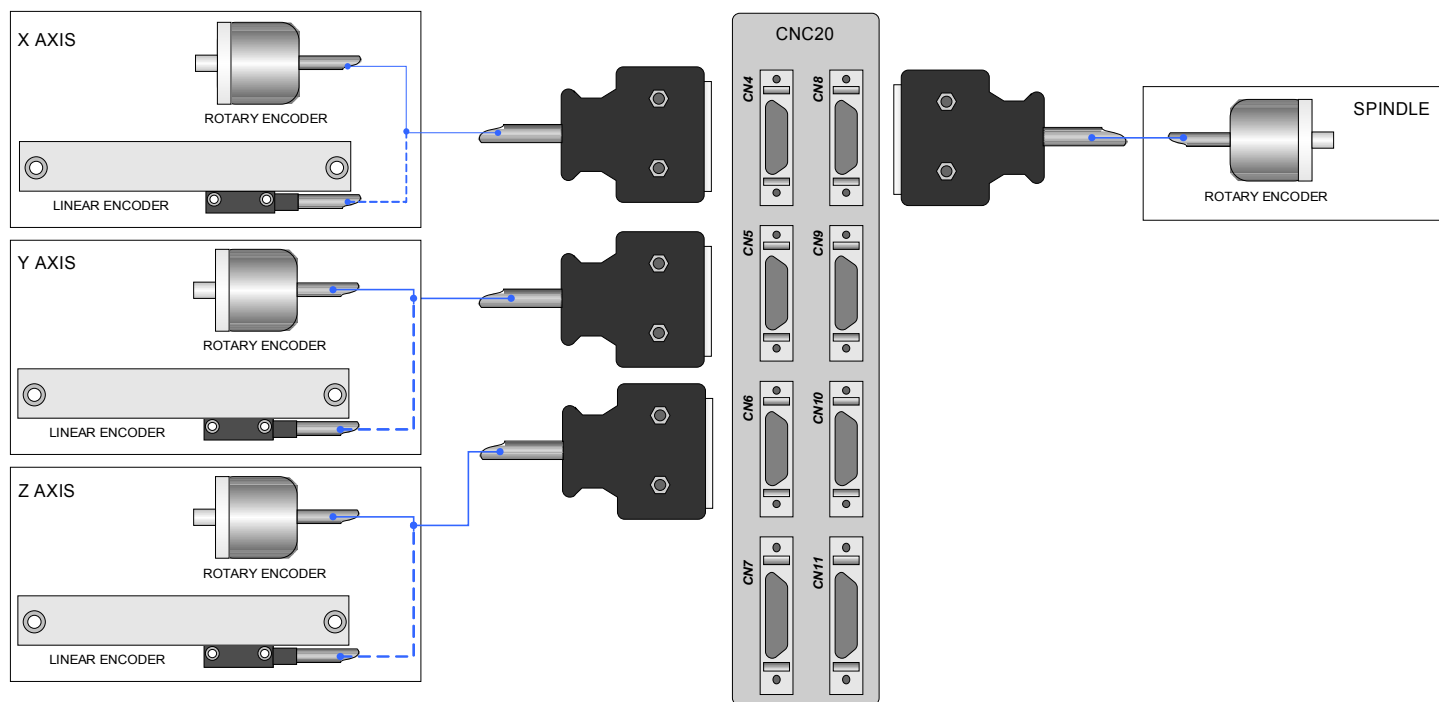
K05E: cable CNC – ENCODER			
CNC		Connectors	ENCODER
Pin	Signal	3M No: 10126 – free leads	Signal
1	A		A
2	*A		*A
3	B		B
4	*B		*B
5	C		C
6	*C		*C
7	GND		0V
8	+5V		VCC

CHARACTERISTICS OF SIGNALS	
Name	Value
Time diagram	A
	*A
	B
	*B
	C
Level Ua	0-5V
	Ua – U*a >200mV
Frequency	Fmax = 1MHz

PARAMETERS		
No (Byte.Bit)	Name	Description
Parameter 040 bits 6-4	DMRX	Multiplier of encoder pulses for X axis: x1, x2, x3, x4
Parameter 041 bits 6-4	DMRZ	Multiplier of encoder pulses for Z axis: x1, x2, x3, x4
Parameter 040 bits 3-0	GRDX	Pulses per revolution X axis (2000, 3000, 4000, 5000, 6000, 8000, 10000)
Parameter 041 bits 3-0	GRDZ	Pulses per revolution Z axis (2000, 3000, 4000, 5000, 6000, 8000, 10000)
PCB OPTIONS 5.0	DDAL0	Ignore DISCONNECT Alarm for X axis: 1 = Yes; 0 = No
PCB OPTIONS 5.1	DDAL1	Ignore DISCONNECT Alarm for Z axis: 1 = Yes; 0 = No
PCB OPTIONS 7.0	DIRA0	Change direction from encoder for X axis: 1 = Yes; 0 = No
PCB OPTIONS 7.1	DIRA1	Change direction from encoder for Z axis: 1 = Yes; 0 = No
PCB OPTIONS 6.0	INVC0	Invert reference 'C' signal for X axis: 1 = Yes; 0 = No
PCB OPTIONS 6.1	INVC1	Invert reference 'C' signal for Z axis: 1 = Yes; 0 = No

5. CONNECTING

5.2.2. Milling machine (X, Y, Z, spindle)



K05E: cable CNC – ENCODER			
CNC		Connectors	ENCODER
Pin	Сигнал	3M No: 10126 – свободни	Signal
1	A		A
2	*A		*A
3	B		B
4	*B		*B
5	C		C
6	*C		*C
7	GND		0V
8	+5V		VCC

Characteristics	
Name	Value
Time diagram	A
	*A
	B
	*B
	C
	*C
Level Ua	0-5V
Ua – U*a	>200mV
Frequency	Fmax = 1MHz

PARAMETERS		
No (Byte.Bit)	Name	Description
Parameter 040 bits 6-4	DMRX	Multiplier of encoder pulses for X axis: x1, x2, x3, x4
Parameter 041 bits 6-4	DMRY	Multiplier of encoder pulses for Y axis: x1, x2, x3, x4
Parameter 042 bits 6-4	DMRZ	Multiplier of encoder pulses for Z axis: x1, x2, x3, x4
Parameter 040 bits 3-0	GRDX	Pulses per revolution X axis (2000, 3000, 4000, 5000, 6000, 8000, 10000)
Parameter 041 bits 3-0	GRDY	Pulses per revolution Y axis (2000, 3000, 4000, 5000, 6000, 8000, 10000)
Parameter 042 bits 3-0	GRDZ	Pulses per revolution Z axis (2000, 3000, 4000, 5000, 6000, 8000, 10000)
PCB OPTIONS 5.0	DDAL0	Ignore DISCONNECT Alarm for X axis: 1 = Yes; 0 = No
PCB OPTIONS 5.1	DDAL1	Ignore DISCONNECT Alarm for Y axis: 1 = Yes; 0 = No
PCB OPTIONS 5.2	DDAL2	Ignore DISCONNECT Alarm for Z axis: 1 = Yes; 0 = No
PCB OPTIONS 7.0	DIRA0	Change direction from encoder for X axis: 1 = Yes; 0 = No
PCB OPTIONS 7.1	DIRA1	Change direction from encoder for Y axis: 1 = Yes; 0 = No
PCB OPTIONS 7.2	DIRA2	Change direction from encoder for Z axis: 1 = Yes; 0 = No
PCB OPTIONS 6.0	INVC0	Invert reference 'C' signal for X axis: 1 = Yes; 0 = No
PCB OPTIONS 6.1	INVC1	Invert reference 'C' signal for Y axis: 1 = Yes; 0 = No
PCB OPTIONS 6.2	INVC2	Invert reference 'C' signal for Z axis: 1 = Yes; 0 = No

Notes:

CN8, CN9 and CN10 may be configured as axis or spindle with feedback (encoder)

In case of 4 axis, CN8 will be 4-th axis connector, and spindle - CN9 or CN10.

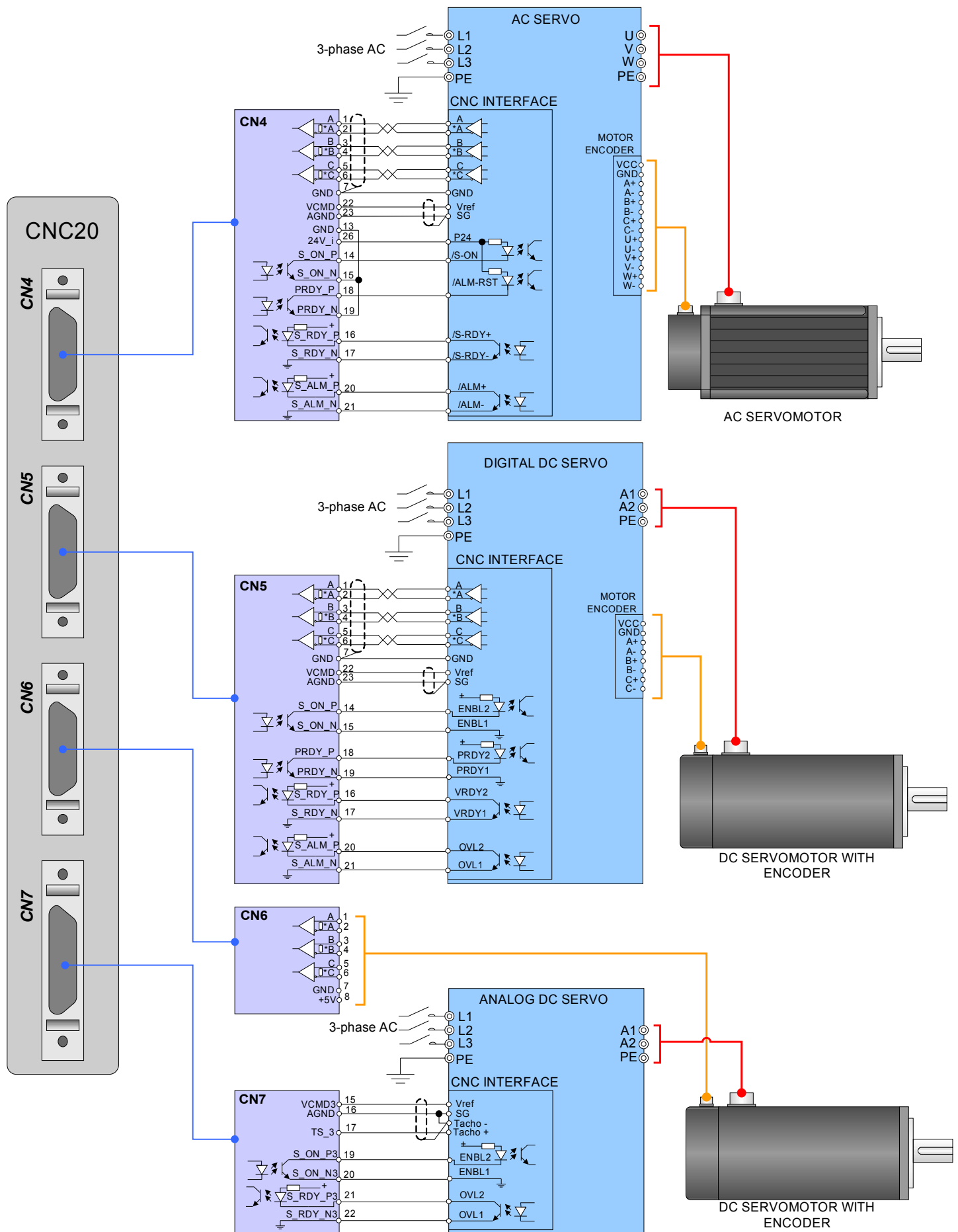
In case of 3 axis, spindle is configured as DAC without feedback on CN7 as DAC1.

In case of 6 axis, spindle is configured as DAC1 (CN7) or DAC2 (CN11) without feedback from encoder.

Spindle is configured from test menu - „Spindle Offset“ with value from CN6 to CN11

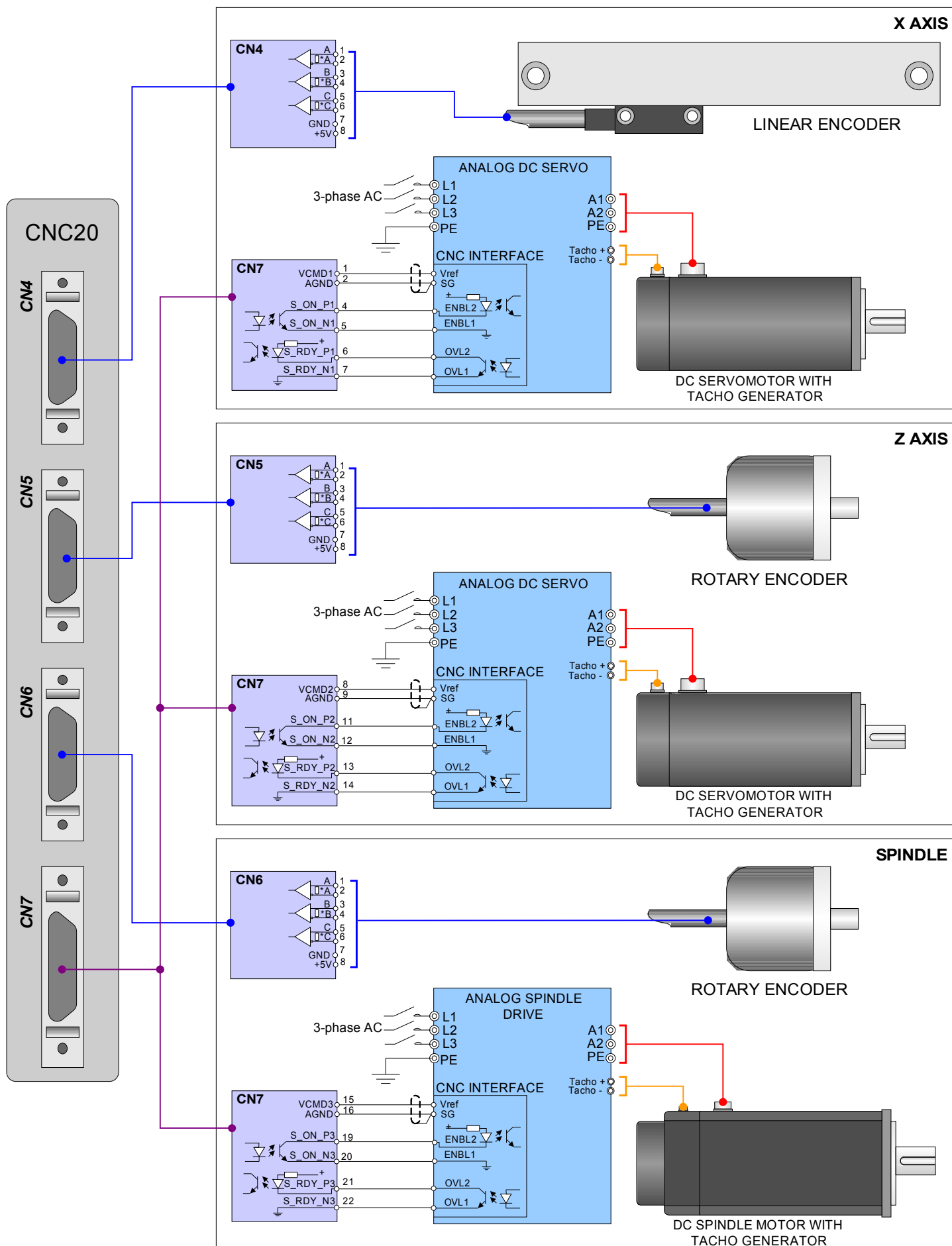
5. CONNECTING

5.3. Connecting CNC with servo



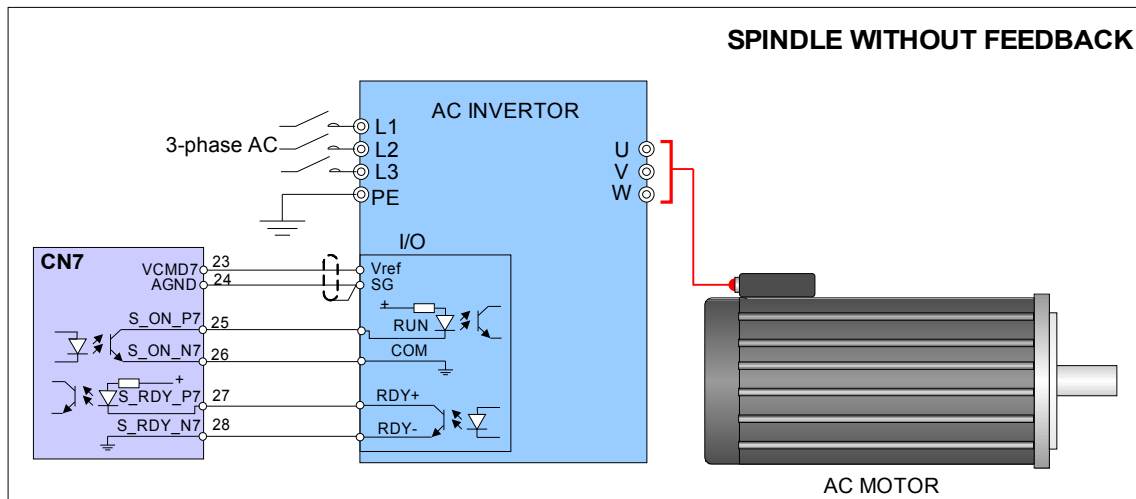
5. CONNECTING

5.3.1. Connecting CNC with servodrive and spindle



5. CONNECTING

5.3.2. Connecting CNC with spindle without feedback



Characteristics signals	
Name	Value
VCMDn	±10V 14 bits (13 bits + sign)
TACHOn	±9V (3V / 1000 rpm when encoder is 2500 ppr)

Parameters for Lathe (X,Z, spindle)		
No (Byte.Bit)	Name	Description
Parameter 612	LPGMX	Loop gain X axis
Parameter 613	LPGMZ	Loop gain Z axis
Parameter 652	DRFTX	Drift compensation X axis
Parameter 653	DRFTZ	Drift compensation Z axis
Parameter 680	SLPGM1	Loop gain spindle for 1-st gear
Parameter 681	SLPGM2	Loop gain spindle for 2-nd gear
Parameter 682	SLPGM3	Loop gain spindle for 3-th gear
Parameter 683	SLPGM4	Loop gain spindle for 4-th gear
Parameter 684	SLPGIN	Loop gain spindle common for all gears
PCB OPTIONS 2.0	DVRDY0	Disable VRDY OFF Alarm X : 1 = Yes; 0 = No
PCB OPTIONS 2.1	DVRDY1	Disable VRDY OFF Alarm Z: 1 = Yes; 0 = No
PCB OPTIONS 3.0	DOVL0	Disable OVERLOAD Alarm X: 1 = Yes; 0 = No
PCB OPTIONS 3.1	DOVL1	Disable OVERLOAD Alarm Z: 1 = Yes; 0 = No
PCB OPTIONS 8.0	CMD0	Invert velocity command for X axis: 1 = Yes; 0 = No
PCB OPTIONS 8.1	CMD1	Invert velocity command for Z axis: 1 = ΔA ; 0 = HE
PCB OPTIONS 10.0	TAH00	Tacho scale X bit0
PCB OPTIONS 11.0	TAH10	Tacho scale X bit1
PCB OPTIONS 10.1	TAH10	Tacho scale Z bit0
PCB OPTIONS 11.1	TAH11	Tacho scale Z bit1

Parameters for Milling machine (X, Y, Z, spindle)		
No (Byte.Bit)	Name	Description
Parameter 612	LPGMX	Loop gain X axis
Parameter 613	LPGMY	Loop gain Y axis
Parameter 614	LPGMZ	Loop gain Z axis
Parameter 652	DRFTX	Drift compensation X axis
Parameter 653	DRFTY	Drift compensation Y axis
Parameter 654	DRFTZ	Drift compensation Z axis
Parameter 542	SPDMAX	Maximum spindle speed
Parameter 543	SPDMIN	Minimum spindle speed
Parameter 570	SPIDS	Spindle orientation speed
Parameter 571	SPIDX	Spindle orientation angle
Parameter 572	SLPGM	Spindle loop gain
PCB OPTIONS 2.0	DVRDY0	Disable VRDY OFF Alarm X : 1 = Yes; 0 = No
PCB OPTIONS 2.1	DVRDY1	Disable VRDY OFF Alarm Y : 1 = Yes; 0 = No
PCB OPTIONS 2.2	DVRDY2	Disable VRDY OFF Alarm Z : 1 = Yes; 0 = No
PCB OPTIONS 3.0	DOVL0	Disable OVERLOAD Alarm X: 1 = Yes; 0 = No
PCB OPTIONS 3.1	DOVL1	Disable OVERLOAD Alarm Y: 1 = Yes; 0 = No
PCB OPTIONS 3.2	DOVL2	Disable OVERLOAD Alarm Z: 1 = Yes; 0 = No
PCB OPTIONS 8.0	CMD0	Invert velocity command for X axis: 1 = Yes; 0 = No
PCB OPTIONS 8.1	CMD1	Invert velocity command for Y axis: 1 = Yes; 0 = No
PCB OPTIONS 8.2	CMD2	Invert velocity command for Z axis: 1 = Yes; 0 = No
PCB OPTIONS 10.0	TAH00	Tacho scale X bit0
PCB OPTIONS 11.0	TAH10	Tacho scale X bit1
PCB OPTIONS 10.1	TAH10	Tacho scale Y bit0
PCB OPTIONS 11.1	TAH11	Tacho scale Y bit1
PCB OPTIONS 10.2	TAH20	Tacho scale Z bit0
PCB OPTIONS 11.2	TAH21	Tacho scale Z bit1

Note:

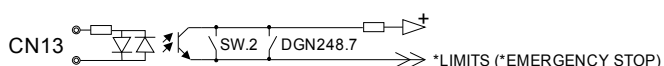
This table is for quick reference only. For all parameters look at section „Parameters“.

6. SIGNALS CNC – MACHINE PANEL

6.1. Signals MP09 - CNC

KEY 299.5	248.6 298.6	248.1 298.1	247.4 297.4	246.7 296.7	246.2 296.2	245.5 295.5	245.0 295.0	244.3 294.3	243.6 293.6	243.1 293.1	242.4 292.4
EMG stop 299.4	248.5 298.5	248.0 298.0	247.3 297.3	246.6 296.6	246.1 296.1	245.4 295.4	244.7 294.7	244.2 294.2	243.5 293.5	243.0 293.0	242.3 292.3
DBLK 248.7	248.4 298.4	247.7 297.7	247.2 297.2	246.5 296.5	246.0 296.0	245.3 295.3	244.6 294.6	244.1 294.1	243.4 293.4	242.7 292.7	242.2 292.2
	248.3 298.3	247.6 297.6	247.1 297.1	246.4 296.4	245.7 295.7	245.2 295.2	244.5 294.5	244.0 294.0	243.3 293.3	242.6 292.6	242.1 292.1
	248.2 298.2	247.5 297.5	247.0 297.0	246.3 296.3	245.6 295.6	245.1 295.1	244.4 294.4	243.7 293.7	243.2 293.2	242.5 292.5	242.0 292.0

Equivalent schematic limit switches



Note:

Limit switches are ignored if SW.2 is ON
Or signal DBLK is ON (DGN248.7)

Legend:



248.2 DGN No Outputs
(Leds, Deblock Limit Switches)
298.2 DGN No Inputs
(Buttons, Emergency Stop, Key)

Additional inputs								
Diagnostic No	7	6	5	4	3	2	1	0
282	ROT2.3	ROT2.2	ROT2.1	ROT2.0	ROT1.3	ROT1.2	ROT1.1	ROT1.0
283						ROT3.2	ROT3.1	ROT3.0
284	ADC2.7	ADC2.6	ADC2.5	ADC2.4	ADC2.3	ADC2.2	ADC2.1	ADC2.0
285	ADC3.7	ADC3.6	ADC3.5	ADC3.4	ADC3.3	ADC3.2	ADC3.1	ADC3.0
286						SW72	SW71	SW70

ROTx – rotary switches

SW7x - external buttons

ADCx – Analog to digital converters

6.2. Signals Remote panel – CNC system M

Signals Remote panel (system M M)								
Diagnostic No	7	6	5	4	3	2	1	0
288				*ESPRM				
289								
290		6-th	5-th	4-th	Z	Y	X	OFF
291						x100	x10	x1

*ESPRM – emergency stop from remote panel

X, Y, Z, 4, 5, 6, x100, x10, x1, OFF - inputs remote panel

Signals Controller – CNC (PMC-X -> CNC)								
Diagnostic No	7	6	5	4	3	2	1	0
249	EXTMPG							MPG3

EXTMPG = 0 MPG3 = 0 active is MPG-1

EXTMPG = 1 MPG3 = 0 active is MPG-2 (remote panel)

EXTMPG = 0 MPG3 = 1 active is MPG-3

6. SIGNALS CNC – MACHINE PANEL

6.3. Signals Remote panel – CNC system T

Signals remote panel - CNC (system T)								
Diagnostic No	7	6	5	4	3	2	1	0
288				*ESPRM				
289								
290					3-та	Z	X	OFF
291						x100	x10	x1

*ESPRM – emergency stop from remote panel

X, Z, 3, x100, x10, x1, OFF - inputs remote panel

Signals Controller – CNC (PMC-X -> CNC)								
Diagnostic No	7	6	5	4	3	2	1	0
249	EXTMPG							MPG3

1. One MPG is active for X and Z axis

PCB Options P000 → MPGC2=0 MPGC1=0 MPGC0=1

EXTMPG = 0 MPG3 = 0 active is MPG-1

EXTMPG = 1 MPG3 = 0 active is MPG-2 (remote panel)

EXTMPG = 0 MPG3 = 1 active is MPG-3

2. Two MPGs are active (for each axis)

PCB Options P000 → MPGC2=0 MPGC1=1 MPGC0=0

EXTMPG = 0 MPG3 = 0 active are MPG-1 for X and MPG-3 for Z

EXTMPG = 0 MPG3 = 1 active are MPG-1 for X and MPG-2 for Z

EXTMPG = 1 MPG3 = 0 active are MPG-2 for X and MPG-3 for Z

7. SIGNALS CNC - CONTROLLER

7.1. Signals PMC-X – CNC system T

Controller → CNC (PMC-X → CNC)								
Diagnostic No	7	6	5	4	3	2	1	0
90								
91								
92								
93								
94								
95								
96	AO0_07	AO0_06	AO0_05	AO0_04	AO0_03	AO0_02	AO0_01	AO0_00
97	SIGN_0			AO0_12	AO0_11	AO0_10	AO0_09	AO0_08
AO0_xx : 13 bit code for analog output DAC1 (±10V) on (CN7) SIGN_0 : sign for DAC1								
98	AO1_07	AO1_06	AO1_05	AO1_04	AO1_03	AO1_02	AO1_01	AO1_00
99	SIGN_1			AO1_12	AO1_11	AO1_10	AO1_09	AO1_08
AO1_xx : 13 bit code for analog output DAC2 (±10V) on (CN11) SIGN_1 : sign for DAC2								
100								
101								
102								
103	ALF	PRC	SPC	SPB	SPA			
ALF : Disable M, B and T functions PRC : When active, current coordinates for X and Z are set to „Work Shift“ coordinate system and shift its origin SPC, SPB и SPA sets spindle override as follows: 1 1 1 = 50% 0 1 1 = 60% 0 1 0 = 70% 1 1 0 = 80% 1 0 0 = 90% 0 0 0 = 100% 0 0 1 = 110% 1 0 1 = 120%								
104	LIMH-	LIMH+	*FLWU					
LIMH- : When active disables motion in direction '-' in HANDLE mode LIMH+ : When active disables motion in direction '+' in HANDLE mode *FLWU : When active (0) following mode is When active disables motion in direction '-' in mode HANDLE enabled								
105						SVF3	SVFZ	SVFX
Each of these signals turns OFF ENABLE signal for each axis and sets axis to following mode. Following mode is enabled from „Setup Options“.								
106								
107								
108								
109								
110								
111								
112	HX/ROV1		*DECX		-X	+X	SBK	BDT
HX : Selects X axis when MPG is used in modes HANDLE, JOG or THND; ROV1 : Rappid override bit 1. *DECX : Deceleration for X axis when zero return is performed. -X : Direction '-' for motion of X axis in modes JOG, TJOG and ZRN +X : Direction '+' of motion of X axis in modes JOG, TJOG and ZRN SBK : Signal for executing program in single block mode BDT : When active, all lines, starting with symbol '/' are skipped								
113	HZ/ROV2		*DECZ		-Z	+Z	MLK	MP1
HZ : Selects Z axis when MPG is used in modes HANDLE, JOG or THND; ROV2 : Rapid override bit 2. *DECZ : Deceleration for Z axis when zero return is performed. -Z : Direction of motion of Z axis in modes JOG, TJOG and ZRN +Z : Direction of motion of Z axis in modes JOG, TJOG and ZRN MLK : Motion commands of axis are not executed but only visualized on coordinates. MP1 : Scale pulses from MPG								

7. SIGNALS CNC - CONTROLLER

7.1. Signals PMC-X – CNC system T

Signals controller → CNC (PMC-X → CNC)								
Diagnostic No	7	6	5	4	3	2	1	0
114	H3/DRN		*DEC3		-3/GR2	+3/GR1		MP2
	H3/DRN : Selects 3th axis when MPG is used in modes HANDLE, JOG or THND; DRN : Dry run in modeAUTO. *DEC3 : Deceleration of 3th axis (C) in reference return mode. -3 : Direction '-' of motion of 3th axis in modes JOG, TJOG and ZRN +3 : Direction '+' of motion of 3th axis in modes JOG, TJOG and ZRN GR2, GR1 : Code of spindle gear (if parameter 25.5 = 1 these bits are moved to DGN 123) MP2 : Scale pulses from MPG							
115								
116								
117								
118								
119								
120	ZRN	*SSTP	SOR	SAR	FIN	ST	STLK	MIX
	ZRN : Mode select signal - when MD4, MD2 and MD1 (101 = JOG) mode is ZRN – zero return. *SSTP : When '0' analog command for spindle is disabled and signal ENBL also is deactivated. SOR : Sets low speed to spindle (in orientation or gear change). SAR : Spindle speed is reached. FIN : Signal, indicates that M, S or T function are completed. ST : Signal for starting CNC. It is ignored if there are alarms, system is not ready or some of signals *SP, *ESP or ERS is active. If ST is not ignored, CNC turns on signal STL. STLK : When active – motion is stopped in current position. If deactivated, motion is completed. Signal ENABLE remains active. MIX : X axis moves in mirror mode.							
121	ERS	RT	*SP	*ESP	OV8	OV4	OV2	OV1
	ERS : External RESET for CNC. This signal is same as „Reset“ button from keyboard. RT : Rapid traverse in modes JOG and TJOG. Look also parameter ISOT (P010.0). *SP : Stops motion and deactivates signal STL. Automatic job is start again when signal ST is activated. *ESP : Signal „Emergency Stop“. When activated, CNC turns OFF signal PRDY, program and motion are stopped. OV8, OV4, OV2 и OV1 : Binary code of feed override from 0 to 150% with step of 10%. 0 0 0 0 = 0% 0 0 0 1 = 10% 0 0 1 0 = 20% ----- 1 1 1 1 = 150%							
122	PN8	PN4	PN2	PN1	KEY	MD4	MD2	MD1
	PN8, PN4, PN2 и PN1 : Binary coded program number to be called with number from 0 to 15. KEY : Signal, disables program edit (if OFF). MD4, MD2 и MD1 : Selects mode of CNC 0 0 0 = MDI 0 0 1 = AUTO 0 1 1 = EDIT 1 0 0 = HANDLE 1 0 1 = JOG 1 1 0 = Teach in JOG 1 1 1 = Tech in HANDLE							
123	DRN				GR2	GR1		
	DRN : Dry run in mode AUTO. If ADDCF = 0 (P025.5), this signal is moved to DGN No 114 GR2, GR1 : Bits for coding of spindle gear. If ADDCF = 0 (P025.5), these signals are moved to DGN No 114.							
124	R08I	R07I	R06I	R05I	R04I	R03I	R02I	R01I
125	SIND	SSIN	SGN		R12I	R11I	R10I	R09I
	R01I - R12I : R code, which is used to set spindle speed from PMC-X (when signal SIND is ON) SIND : Selects source of spindle command – '0' = CNC, '1' = PMC. SSIN : Selects source of spindle direction – '0' = CNC, '1' = PMC. SGN : Inverts sign for spindle, when it is commanded from PMC – '0' = positive, '1' = negative.							

7. SIGNALS CNC - CONTROLLER

7.1. Signals PMC-X – CNC system T

Signals controller → CNC (PMC-X → CNC.T)								
Diagnostic No	7	6	5	4	3	2	1	0
126	CDZ	SMZ		OVC				
	CDZ : This signal is valid only in tread cutting. Tread is with chamfer ('1') or not ('0'). SMZ : If this signal is active, exact stop is executed between two interpolations ('1') or not executed ('0'). OVC : Sets feed override to 100%.							
127								
128								
129								
130	UI07	UI06	UI05	UI04	UI03	UI02	UI01	UI00
131	UI15	UI14	UI13	UI12	UI11	UI10	UI09	UI08
	UI00 - UI15 : General purpose inputs from PMC to CNC. Used in macro programming.							
132	GOQSM	WOQSM	OFN5	OFN4	OFN3	OFN2	OFN1	OFN0
	GOQSM : When active, PMC-X automatically sets geometric correction. WOQSM : When active, PMC-X automatically sets correction for tool wear. OFN0 - OFN5 : Selects number of correction when it is set automatically.							
133	WOSET							
	WOSET : Command from PMC-X for setting of type and number of correction							

Signals CNC → controller (CNC.T → PMC-X)								
Diagnostic No	7	6	5	4	3	2	1	0
148	OP	SA	STL	SPL		ZP3	ZPZ	ZPX
	OP : When this signal is '1', indicates that CNC executes automatic operation. SA : Indicates that there aren't servo alarms or Emergency stop is not activated (*ESP). STL : Signal „start lamp“, indicates automatic operation of CNC. SPL : Signal „stop lamp“, indicates, that automatic operation was terminated by signal *SP. ZP3 : Positioning in first reference point is completed for C axis. ZPZ : Positioning in first reference point is completed for Z axis. ZPX : Positioning in first reference point is completed for X axis.							
149	MA			ENB	DEN	BAL	RST	AL
	MA : When '1', CNC is turned ON and the base software is running. This signal don't depends on „Ready“, „Not Ready“ and „Alarm“. ENB : Enable for spindle, when it is controlled by CNC. DEN : Signal for „end of interpolation“. Int is turned on only when in the same line are M, S or T functions and it is used as confirm BAL : Сигнал „Аларма батерия“, показва че нивото на батерията за поддръжка на RAM е ниско. RST : Indicates, that button „RESET“ from keyboard is pressed. AL : Active, if CNC in alarm.							
150	BF		DST		TF	SF		MF
	BF : Enables decoding of B function. DST : Indicates, that button „Start“ from keyboard is pressed. TF : Enables decoding of BCD coded T function. SF : Enables decoding of BCD coded S function. Valid when SANLG = 0 (Setup Options P0.4) MF : Enables decoding of BCD coded M function.							
151	M28	M24	M22	M21	M18	M14	M12	M11
	M11 - M28 : BCD coded M function.							
152	S28	S24	S22	S21	S18	S14	S12	S11
	S11 - S28 : BCD coded S function. When SANLG = '1' (Setup Options P0.4) it is not generates. Spindle speed is controlled by 12 bit R-code or by analog command on DAC.							
153	T28	T24	T22	T21	T18	T14	T12	T11
	M11 - M28 : BCD coded T function. See parameters GOFU2 (P013.1), T2T4 (P014.6), T2 (P014.0)							
154								SPAL
	SPAL : Indicates, that fluctuation of actually spindle speed is over specified by parameter R in cycle G25.							
155								
156								
157								
158	AR7	AR6	AR5	AR4	AR3	AR2	AR1	AR0
159	AR15	AR14	AR13	AR12	AR11	AR10	AR9	AR8
	AR0-AR15 : Actually spindle speed in binary code.							

7. SIGNALS CNC - CONTROLLER

7.1. Signals PMC-X – CNC system T(cont.)

Signals CNC -> controller (CNC.T -> PMC-X)								
Diagnostic No	7	6	5	4	3	2	1	0
160						ZP23	Z2PZ	Z2PX
	ZP23 : Indicates, that positioning in second reference point for C axis is completed. ZP2Z : Indicates, that positioning in second reference point for Z axis is completed. ZP2X : Indicates, that positioning in second reference point for X axis is completed.							
161	UO07	UO06	UO05	UO04	UO03	UO02	UO01	UO00
162	UO15	UO14	UO13	UO12	UO11	UO10	UO09	UO08
	UO00 - UO15 : Bits from macro. Used as input signals for PMC-X.							
163								
164								
165	PX7	PX6	PX5	PX4	PX3	PX2	PX1	PX0
	PX0 - PX7 : Bits, indicates in which part of X axis is tool. CNC indicates that only if TOOLP (Setup Options P1.4 = '1') and value of parameter P713 > 0.							
166								
167	PZ7	PZ6	PZ5	PZ4	PZ3	PZ2	PZ1	PZ0
	PZ0 - PZ7 : Bits, indicates in which part of Z axis is tool. CNC indicates that only if TOOLP (Setup Options P1.4 = '1') and value of parameter P713 > 0.							
168								
169								
170								
171								
172	R08O	R07O	R06O	R05O	R04O	R03O	R02O	R01O
173					R12O	R11O	R10O	R09O
	R01O - R12O : R code for external DAC, when CNC controlled spindle speed (SIND = '0') and SANLG (Setup Options P0.4 = '1').							
174								
175								
176						AM3	AMZ	AMX
	AM3 : Indicates, that C axis is in motion. AMZ : Indicates, that Z axis is in motion. AMX : Indicates, that X axis is in motion.							
177	SSAL				DCNM3	DCNM2	DCNM1	DCNKB
	SSAL : Indicates, that spindle speed is not in tolerance, specified by parameter P107. DCNM3 : Indicates state of I/O module No 3 - '1' = ON, '0' = OFF. DCNM2 : Indicates state of I/O module No 2 - '1' = ON, '0' = OFF. DCNM1 : Indicates state of I/O module No 1 - '1' = ON, '0' = OFF. DCNKB : Indicates state of machine panel - '1' = ON, '0' = OFF.							
178	GP07	GP06	GP05	GP04	GP03	GP02	GP01	GP00
179	GP15	GP14	GP13	GP12	GP11	GP10	GP09	GP08
	GP00 - GP15 : Indicates the state of operator's switches. Names of switches are set by parameters GPSW00 – GPSW157 (P172 – P299).							
276	B7	B6	B5	B4	B3	B2	B1	B0
277	B15	B14	B13	B12	B11	B10	B9	B8
278	B23	B22	B21	B20	B19	B18	B17	B16
	B0 - B23 : Binary coded B code. Parameter BCODE (Setup options P0.6) enables using of B code.							

Signals MT -> CNC (MT-> CNC.T)								
Diagnostic No	7	6	5	4	3	2	1	0
8	HX/ROV1	ST	*DECX	SOR	-X	+X	MP2	MP1
9	HZ/ROV2	*SP	*DECZ	SAR	-Z	+Z	MLK	*ILK
10	H3/DRN	SBK	*LZ	*SSTP	-3/GR2	+3/GR1	OV4	OV4
11		BDT		ERS			OV2	OV1
12		FIN					ZRN	MD4
13							MD2	MD1
33			KEY	*ESP				

7. SIGNALS CNC - CONTROLLER

7.2. Signals PMC-X – CNC system M

Signals controller → CNC (PMC-X → CNC.M)								
Diagnostic No	7	6	5	4	3	2	1	0
90								
91								
92								
93								
94								
95								
96	AO0_07	AO0_06	AO0_05	AO0_04	AO0_03	AO0_02	AO0_01	AO0_00
97	SIGN_0			AO0_12	AO0_11	AO0_10	AO0_09	AO0_08
AO0_xx : binary code, used to set DAC1 (CN7) value from PMC-X (±10V) SIGN_0 : sign for DAC1								
98	AO1_07	AO1_06	AO1_05	AO1_04	AO1_03	AO1_02	AO1_01	AO1_00
99	SIGN_1			AO1_12	AO1_11	AO1_10	AO1_09	AO1_08
AO1_xx binary code, used to set DAC2 (CN11) value from PMC-X (±10V) SIGN_1 sign for DAC2								
100								
101								
102								
103	ALF	ZNG	SPC	SPB	SPA	PBACK		SKIP
ALF : Disables M, B and T functions ZNG : This signal is similar to MLK, but is for Z axis only SPC, SPB и SPA spindle override: 1 1 1 = 50% 0 1 1 = 60% 0 1 0 = 70% 1 1 0 = 80% 1 0 0 = 90% 0 0 0 = 100% 0 0 1 = 110% 1 0 1 = 120% PBACK : When this signal is ON, CNC executes current program in backward mode (*special software only) SKIP : When this signal is activated, and active G function is G31 current line is terminated and CNC start execution of next line in program.								
104	LIMH-	LIMH+	*FLWU		JOV8	JOV4	JOV2	JOV1
LIMH- : Disables motion in direction '-' in mode HANDLE LIMH+ : Disables motion in direction '+' in mode HANDLE *FLWU : If active (0) enables follow mode JOV8, JOV4, JOV2, JOV1 : Binary coded feed override in modes JOG and TJOG 0 0 0 0 = 0% 0 0 0 1 = 10% 0 0 1 0 = 20% 1 1 1 1 = 150%								
105			SVF6	SVF5	SVF4	SVFZ	SVFY	SVFX
Each of these signals turns OFF ENABLE signal for corresponding axis and motion is controlled from external following module. This mode is enabled in menu „Setup Options“.								
106	T28I	T24I	T22I	T21I	T18I	T14I	T12I	T11I
107	T48I	T44I	T42I	T41I	T38I	T34I	T32I	T31I
T11I – T48I : value of T code, displayed on screen.								
108	UD7	UD6	UD5	UD4	UD3	UD2	UD1	UD0
109	UD15	UD14	UD13	UD12	UD11	UD10	UD9	UD8
110	UD23	UD22	UD21	UD20	UD19	UD18	UD17	UD16
111	UD31	UD30	UD29	UD28	UD27	UD26	UD25	UD24
UD0 - UD31 : Value of user variable, shown on screen. For visualization, type and name of variable see parameters P032.1, P138, P139								

7. SIGNALS CNC - CONTROLLER

7.2. Signals PMC-X – CNC system M(cont.)

Signals controller → CNC (PMC-X → CNC.M)								
Diagnostic No	7	6	5	4	3	2	1	0
112	HX/ROV1		*DECX		-X	+X	SBK	BDT
	HX : Selects X axis when MPG is used in modes HANDLE, JOG or THND; ROV1 : Rappid override bit 1. *DECX : Deceleration of X axis in reference return mode. -X : Direction of motion '-' for X axis in modes JOG, TJOG and ZRN +X : Direction of motion '+' for X axis in modes JOG, TJOG and ZRN SBK : When activated, lines are executed one by one. BDT : Block delete – when this signal is activated, all lines started with '/' will be skipped.							
113	HY/ROV2		*DECY		-Y	+Y	MLK	*ILK
	HY : Selects Y axis when MPG is used in modes HANDLE, JOG or THND; ROV2 : Rapid override bit 2; ROV2. *DECY : Deceleration of Y axis in reference return mode. -Y : Direction of motion '-' for Y axis in modes JOG, TJOG and ZRN +Y : Direction of motion '+' for Y axis in modes JOG, TJOG and ZRN MLK : Motion on all axis are ignored and simulated on the screen. *ILK : Locks motion for Z or for all axis. See also parameters P008.7 and P012.1							
114	HZ/DRN		*DECZ		-Z	+Z	GR2I	GR1I
	HZ : Selects Z axis when MPG is used in modes HANDLE, JOG or THND; DRN : Пробен ход в режим AUTO. *DECZ : Deceleration of Z axis in reference return mode. -Z : Direction of motion '-' for Z axis in modes JOG, TJOG and ZRN +Z : Direction of motion '+' for Z axis in modes JOG, TJOG and ZRN GR2I, GR1I : These bits coding spindle gear. It is visualized if P036.1 = '1'							
115	H4		*DEC4		-4	+4	LTBL2	LTBL1
	H4 : Selects 4 axis when MPG is used in modes HANDLE, JOG or THND *DEC4 : Deceleration of 4 axis in reference return mode. -4 : Direction of motion '-' for 4 axis in modes JOG, TJOG and ZRN +4 : Direction of motion '+' for 4 axis in modes JOG, TJOG and ZRN LTBL2 : When active, feed override is selected from table (2) in mode DRY RUN (DRN='1') for laser machines. LTBL1 : When active, feed override is selected from table (1) in mode DRY RUN (DRN='1') for laser machines.							
116	H5		*DEC5		-5	+5		
	H5 : Selects 5 axis when MPG is used in modes HANDLE, JOG or THND *DEC5 : Deceleration of 5 axis in reference return mode. -5 : Direction of motion '-' for 5 axis in modes JOG, TJOG and ZRN +5 : Direction of motion '+' for 5 axis in modes JOG, TJOG and ZRN							
117	H6		*DEC6		-6	+6		
	H6 : Selects 6 axis when MPG is used in modes HANDLE, JOG or THND *DEC6 : Deceleration of 6 axis in reference return mode. -6 : Direction of motion '-' for 6 axis in modes JOG, TJOG and ZRN +6 : Direction of motion '+' for 6 axis in modes JOG, TJOG and ZRN							
118								
119								
120	ZRN	*SSTP	SOR	SAR	FIN	ST	MP2	MP1
	ZRN : Selects according MD4, MD2 and MD1 (101 = JOG) mode ZRN – manual reference point return. *SSTP : When '0' analog command for spindle speed is stopped and signal ENBL for spindle is deactivated. SOR : Selects low speed for spindle (when change gear or spindle orientation). SAR : Signal confirmation, that spindle is reached selected speed. See also parameters P24.2 и P110 FIN : Signal response, that M, S or T function is completed. See also parameter P009 ST : Signal start for CNC. It is ignored is there are alarms, not ready or some of signals *SP, *ESP or ERS is active. If ST is not ignored, CNC returns signal STL. MP2, MP1 : Bits, coding step of Handwheel – x1, x10, x100.							

7. SIGNALS CNC - CONTROLLER

7.2. Signals PMC-X – CNC system M(cont.)

Signals controller → CNC (PMC-X → CNC.M)								
Diagnostic No	7	6	5	4	3	2	1	0
121	ERS	RT	*SP	*ESP	OV8	OV4	OV2	OV1
ERS : External RESET for CNC. RT : Signal rapid traverse in modes JOG and TJOG. See also parameter ISOT (P010.0). *SP : Stops feed on axis and deactivates signal STL. Automatic job is started again if signal ST is activated. *ESP : Signal „Emergency Stop“. When activated, PRDY is turned OFF, program execution is stopped, motion on axis is terminated and CNC is restarted. OV8, OV4, OV2 и OV1 : Code for feed override from 0 to 150% with increment of 10%. 0 0 0 0 = 0% 0 0 0 1 = 10% 0 0 1 0 = 20% ----- 1 1 1 1 = 150%								
122	PN8	PN4	PN2	PN1	KEY	MD4	MD2	MD1
PN8, PN4, PN2 и PN1 : Binary coded number of program to be executed. KEY : If OFF, disables editing of programs. MD4, MD2 и MD1 : Selects mode of CNC 0 0 0 = MDI 0 0 1 = AUTO 0 1 1 = EDIT 1 0 0 = HANDLE 1 0 1 = JOG 1 1 0 = Teach in JOG 1 1 1 = Tech in HANDLE								
123								
124	R08I	R07I	R06I	R05I	R04I	R03I	R02I	R01I
125	SIND	SSIN	SGN		R12I	R11I	R10I	R09I
R01I - R12I : R code, used to set spindle speed by PMC-X (if signal SIND is active) SIND : Selects the source of spindle command – '0' = CNC, '1' = PMC. SSIN : Selects the source of spindle command sign – '0' = CNC, '1' = PMC. SGN : Sign of spindle command, when it is controlled by PMC – '0' = positive, '1' = negative.								
126		SMZ		OVC	SIND1	IMAC	CLRC	SXDN
SMZ : Determinates if there will be exact stop between two interpolation lines ('1') or not ('0') OVC : Fixes feed override to 100% SIND1 : When active, angle of spindle orientation is determinated by P578, else it is determinated by P571. It is used, when second spindle orientation angle is needed. IMAC : When activated in auto mode, CNC calls macro-program number O9009 CLRC : When activated, CNC automatic calls G54 with current coordinates as arguments. SXDN : Signal for spindle orientation. See also parameters P001.4, P570, P571, P574 и P575								
127	MIR4		OV12	OV11			MIRY	MIRX
MIR4 : Activates mirror on 4th axis. OV12, OV11 : These bits expands correction of feed override to 630% by step of 10%. MIRY : Activates mirror on Y axis. MIRX : Activates mirror on X axis.								
128			*IT6	*IT5	*IT4	*ITZ	*ITY	*ITX
*ITX, *ITY, ..., *IT6 : Bits, locking motion on corresponding axis (X, Y, Z, ...). See parameter P008.7								
129	RLSOT		-LIMZ	-LIMY	-LIMX	+LIMZ	+LIMY	+LIMX
RLSOT : When activated, software limits are ignored. -LIMX, -LIMY, -LIMZ : On falling edge of this signal ('1'→'0') current coordinates of axis are written as software limits in minus direction (parameters P788, P789, P790) +LIMX, +LIMY, -LIMZ : On falling edge of this signal ('1'→'0') current coordinates of axis are written as software limits in plus direction (parameters P780, P781, P782)								
130	UI07	UI06	UI05	UI04	UI03	UI02	UI01	UI00
131	UI15	UI14	UI13	UI12	UI11	UI10	UI09	UI08
UI00 - UI15 : These bits are used as inputs from macro programs.								

7. SIGNALS CNC - CONTROLLER

7.2. Signals PMC-X – CNC system M(cont.)

Signals CNC -> controller (CNC.M -> PMC-X)								
Diagnostic No	7	6	5	4	3	2	1	0
148	OP	SA	STL	SPL				
	OP : If active ('1') CNC executes automatic operation or was executing, before it was terminated. SA : When '1', indicates that there aren't servo alarms or activated Emergency Stop button. STL : Signal „start lamp“ - CNC executes automatic operation. SPL : Signal „stop lamp“, indicates that automatic operation was terminated by signal *SP.							
149	MA		TAP	ENB	DEN	BAL	RST	AL
	MA : This signal is '1',when CNC is ON and base software is running. This signal don't depends on „Ready“, „Not Ready“ or „Alarm“. TAP : This signal is active', when CNC executes tapping functions (G74 or G84) ENB : Enables spindle, when it is controlled from CNC. DEN : Signal for „interpolation end“. This signal is active only if in the same line are M, S or T function. It is used as confirmation for starting these function. BAL : Signal „battery alarm“. Voltage of SRAM battery i too low. RST : Indicates, that „RESET“ button from keyboard is pressed. AL : Active if CNC in alarm.							
150	BF1	BF2	DST		TF	SF		MF
	BF1 : Enables decoding of lower 4 bits of B function. BF2 : Enables decoding of higher 4 bits of B function. DST : Indicates, that „Start“ button from keyboard was pressed. TF : Enables decoding of BCD coded T function. SF : Enables decoding of BCD coded S function. Valid if SANLG = 0 (Setup Options P0.4) MF : Enables decoding of BCD coded M function.							
151	M28	M24	M22	M21	M18	M14	M12	M11
	M11 - M28 : BCD coded M function.							
152	S28	S24	S22	S21	S18	S14 / GR3	S12 / GR2	S11 / GR1
	S11 - S28 : BCD coded S function. When SANLG (Setup Options P0.4 = '1') these signals are not generated, spindle speed are controlled by 12 bits R-code or analog command on DAC. GR3, GR2, GR1 : Bits, indicates needed gear (1-st, 2-nd or 3-th) for spindle in current speed. Signals are valid if P012.7 = '0' (SPAM) and there are automatic gear change.							
153	T28	T24	T22	T21	T18	T14	T12	T11
	M11 - M28 : BCD код на T функцията (1-ва и 2-ра цифра). Виж параметри GOFU2 (P013.1), T2T4 (P014.6), T2 (P014.0)							
154	M00	M01	M02	M30	B38	B34	B32	B31
	M00 : Indicates that CNC is in program stop (M00) M01 : Indicates that CNC is in optional program stop (M01) M02 : Indicates that CNC is in program stop (M02) M30 : Indicates that CNC is in program stop (M30) B38 – B31 : 3d digit of B code (in BCD)							
155	B28	B24	B22	B21	B18	B14	B12	B11
	B28 – B21 : 2 nd digit of B code (in BCD) B18 – B11 : 1 st digit of B code (in BCD)							
156	T48	T44	T42	T41	T38	T34	T32	T31
	T48 – T41 : 4 th digit of T code (in BCD) T38 – T31 : 3d digit of T code (in BCD)							
157								
158								
159								

7. SIGNALS CNC - CONTROLLER

7.2. Signals PMC-X – CNC system M(cont.)

Signals CNC -> controller (CNC.M -> PMC-X)								
Diagnostic No	7	6	5	4	3	2	1	0
160			ZP6	ZP5	ZP4	ZPZ / EF	ZPY	ZPX
	ZPn : Indicates, that positioning in first reference point for corresponding axis (X, Y, Z,...) is completed. EF : Signal for execution of external function. See parameter P011.4							
161			ZP26	ZP25	ZP24	ZP2Z	ZP2Y	ZP2X
	ZP2n : Indicates, that positioning in second reference point for corresponding axis (X, Y, Z,...) is completed.							
162	UO07	UO06	UO05	UO04	UO03	UO02	UO01	UO00
163	UO15	UO14	UO13	UO12	UO11	UO10	UO09	UO08
	UO00 - UO15 : Bits from macro. Used as inputs for PMC-X							
164			ZP36	ZP35	ZP34	ZP3Z	ZP3Y	ZP3X
	ZP3n : Indicates, that positioning in 3th reference point for corresponding axis (X, Y, Z,...) is completed.							
165			ZP46	ZP45	ZP44	ZP4Z	ZP4Y	ZP4X
	ZP4n : Indicates, that positioning in 4 th reference point for corresponding axis (X, Y, Z,...) is completed.							
166								
167								
168								
169								
170								
171								
172	R08O	R07O	R06O	R05O	R04O	R03O	R02O	R01O
173					R12O	R11O	R10O	R09O
	R01O - R12O : R code for external DAC, when CNC controlled spindle speed (SIND = '0') and SANLG (Setup Options P0.4 = '1').							
174								SXDN
	SXDN : Indicates, that spindle is oriented (in index position).							
175								
176			AM6	AM5	AM4	AMZ	AMY	AMX
	AMn : Status of motion for each axis (X, Y, Z, ...).							
177					DCNM3	DCNM2	DCNM1	DCNKB
	DCNM3 : Status of I/O module No 3 - '1' = ON, '0' = OFF. DCNM2 : Status of I/O module No 2 - '1' = ON, '0' = OFF. DCNM1 : Status of I/O module No 1 - '1' = ON, '0' = OFF. DCNKB : Status of machine panel - '1' = ON, '0' = OFF.							
178	GP07	GP06	GP05	GP04	GP03	GP02	GP01	GP00
179	GP15	GP14	GP13	GP12	GP11	GP10	GP09	GP08
	GP00 - GP15 : Indicates status of operators switches. Names of operators switches are determined by parameters GPSW00 – GPSW157 (P172 – P299).							

Signals MT -> CNC (MT-> CNC.M)								
Diagnostic No	7	6	5	4	3	2	1	0
8	HX/ROV1	ST	*DECX	SOR	-X	+X	MP2	MP1
9	HY/ROV2	*SP	*DECY	SAR	-Y	+Y	MLK	*ILK
10	HZ/DRN	SBK	*DECZ	*SSTP	-Z	+Z	OV4	OV4
11	H4	BDT	*DEC4	ERS	-4	+4	OV2	OV1
12	H5	FIN	*DEC5		-5	+5	ZRN	MD4
13	H6		*DEC6	RT	-6	+6	MD2	MD1
33			KEY	*ESP				

8. Diagnostics

8.1. Description diagnostics CNC T

Signals MT -> PMC-X (Machine inputs from I/O module No 1)								
Diagnostic No	7	6	5	4	3	2	1	0
8								
9								
10			*+LZ					
11								
12 or 34								
Input signals from module No 2 are: DGN16 – DGN20, from module No 3: DGN24 – DGN28								

Signals MT -> PMC-X (Machine inputs from Machine Panel)								
Diagnostic No	7	6	5	4	3	2	1	0
33			KEY	*ESP				

CNC outputs								
Diagnostic No	7	6	5	4	3	2	1	0
51	PRDY					ENB3	ENBZ	ENBX

Signals PMC-X -> MT (Outputs on I/O module No 1)								
Diagnostic No	7	6	5	4	3	2	1	0
52								
53								
54								
Output signals on module No 2 are: DGN60 - DGN62, on module No 3: DGN68 – DGN70								

Status signals								
Diagnostic No	7	6	5	4	3	2	1	0
4						PC3	PCZ	PCX
PCX : Reference pulse from X axis encoder. PCZ : Reference pulse from Z axis encoder. PC3 : Reference pulse from C axis encoder.								
40			OVHZ	OVLZ	VRDYZ	OHX	OVLX	VRDYG
VRDYGn : Status of signal „ready“ from servodrive for each axis. OVLn : Status of signal „overload“ from servodrive for each axis. OVHn : Status of signal „overheat“ from servodrive/servomotor for each axis. Note: Enabling these alarm is from PCB Options P02, P03 и P04.								
700		SCT	ITL	OVZ	INP	DWL	MTN	FIN
SCT : CNC is waiting signal from spindle for attained speed. ITL : Motion is not allowed (Interlock). OVZ : Feed override is 0%. INP : In position for some axis is over allowed in parameters. DWL : Dwell is executed. MTN : Motion is executed. FIN : Some of functions M, S, T or B are executed (and not finished).								
701			RST					
RST : „Reset“ button, emergency stop or external reset from controller are active.								
702	STP	REST	EMS		RSTB			CSU
STP : Automatic execution is stopped. It is set when: there is external reset signal, emergency stop, feed hold, or AUTO mode is changed (JOG, HANDLE, TJOG, THANDLE). REST : Signal for external reset. EMS : Emergency stop is active. RSTB : „Reset“ button is pressed. CSU : Active in case of servoalarm.								
800	Position deviation X axis							
801	Position deviation Z axis							
810	Machine position X axis							
811	Machine position Z axis							
830	Analog command X axis							
831	Analog command Z axis							

8. Diagnostics

8.2. Description diagnostics CNC M

Signals MT -> PMC-X (Machine inputs from I/O module No 1)								
Diagnostic No	7	6	5	4	3	2	1	0
8								
9								
10								
11								
12 or 34								
Inputs from module No 2: DGN16 – DGN20, from module 3: DGN24 – DGN28								

CNC outputs								
Diagnostic No	7	6	5	4	3	2	1	0
51	PRDY		ENB6	ENB5	ENB4	ENBZ	ENBY	ENBX

Signals PMC-X -> MT (Outputs on I/O module No 1)								
Diagnostic No	7	6	5	4	3	2	1	0
52								
53								
54								
Outputs on I/O module No 2: DGN60 - DGN62, on I/O module No 3: DGN68 – DGN70								

Signals MT -> PMC-X (Machine Inputs from Machine panel)								
Diagnostic No	7	6	5	4	3	2	1	0
33			KEY	*ESP				

8. DIAGNOSTICS

8.2. Description diagnostics CNC M (cont.)

Status signals								
Diagnostic No	7	6	5	4	3	2	1	0
4			PC6	PC5	PC4	PCZ	PCY	PCX
	PCn : Reference signal from encoder for each axis (X, Y, Z, 4, 5, 6).							
40	OVLZ	VRDYZ	OVHY	OVLY	VRDYY	OHX	OVLX	VRDYX
41					CPIN2	CPIN1	RDYS	OHZ
	VRDYN : Status of signal „ready“ from servodrive for each axis (X, Y, Z).							
	OVLn : Status of signal „overload“ from servodrive for each axis (X, Y, Z).							
	OVHn : Status of signal „overheat“ from servodrive/servomotor for each axis (X, Y, Z).							
	Note: Enabling these alarm is from PCB Options P02, P03 и P04.							
	RDYS : Signal „ready“ from spindle on DAC1.							
	CPIN2, CPIN1 : General purpose inputs from CN7							
42	OVL6	VRDY6	OH5	OVL5	VRDY5	OH4	OVL4	VRDY4
43					CPIN2	CPIN1	RDYS	OH6
	VRDYN : Status of signal „ready“ from servodrive for each axis (4, 5, 6).							
	OVLn : Status of signal „overload“ from servodrive for each axis (4, 5, 6).							
	OVHn : Status of signal „overheat“ from servodrive/servomotor for each axis (4, 5, 6).							
	Note: Enabling these alarm is from PCB Options P02, P03 и P04.							
	RDYS : Signal „ready“ from spindle on DAC2.							
	CPIN2, CPIN1 : General purpose inputs from CN11							
700		SCT	ITL	OVZ	INP	DWL	MTN	FIN
	SCT : CNC is waiting signal from spindle for attained speed.							
	ITL : Motion is not allowed (Interlock).							
	OVZ : Feed override is 0%.							
	INP : In position for some axis is over allowed in parameters.							
	DWL : Dwell is executed.							
	MTN : Motion is executed.							
	FIN : Some of functions M, S, T or B are executed (and not finished).							
701			RST					
	RST : „Reset“ button, emergency stop or external reset from controller are active.							
702	STP	REST	EMS		RSTB			CSU
	STP : Automatic execution is stopped. It is set when: there is external reset signal, emergency stop, feed hold, or AUTO mode is changed (JOG, HANDLE, TJOG, THANDLE).							
	REST : Signal for external reset.							
	EMS : Emergency stop is active.							
	RSTB : „Reset“ button is pressed.							
	CSU : Active in case of servoalarm.							
800	Position deviation X axis							
801	Position deviation Y axis							
802	Position deviation Z axis							
803	Position deviation 4 axis							
804	Position deviation 5 axis							
805	Position deviation 6 axis							
810	Machine position X axis							
811	Machine position Y axis							
812	Machine position Z axis							
813	Machine position 4 axis							
814	Machine position 5 axis							
815	Machine position 6 axis							
830	Analog command X axis							
831	Analog command Y axis							
832	Analog command Z axis							
833	Analog command 4 axis							
834	Analog command 5 axis							
835	Analog command 6 axis							

9. PARAMETERS

9.1. Description parameters system T

Parameters CNC.T								
Parameter No	7	6	5	4	3	2	1	0
P001	ADFT	RDRN	DECI	ORC	TOC	DCS		SCW
	ADFT	0 : Automatic drift compensation is OFF 1 : Automatic drift compensation is ON						
	RDRN	0 : Signal DRN is NOT effective in rapid traverse 1 : Signal DRN is effective in rapid traverse						
	DECI	0 : Active state of deceleration signal (DEC) for all axis is '0' 1 : Active state of deceleration signal (DEC) for all axis is '1'						
	ORC	0 : offset value becomes a diameter designation. 1 : offset value becomes a radius designation.						
	TOC	0 : offset is not canceled by "reset" button. 1 : offset is canceled by "reset" button.						
	DCS	0 : [START/OUTPUT] button goes through PMC-X 1 : [START/OUTPUT] button starts immediately in MDI mode						
	SCW	0 : Machine screw is metric. 1 : Machine screw is inch.						
Parameter No	7	6	5	4	3	2	1	0
P002		TJHD					PPD	ADSP
	TJHD	0 : MPG usage in TJOG mode is disabled 1 : MPG usage in TJOG mode is enabled						
	PPD	0 : relative coordinate system is not preset when the coordinate system is set 1 : relative coordinate system is preset when the coordinate system is set						
	ADSP	0 : programs sent through serial interface are without separators between words 1 : programs sent through serial interface are with separators between words						
Parameter No	7	6	5	4	3	2	1	0
P008				MFPR			CPF2	CPF1
	MFPR	0 : Manual synchronous feed is active. 1 : Manual synchronous feed is not active.						
	CPF2, CPF1 : backlash compensation pulse frequency							
	0	1	= 64kHz					
	1	0	= 128kHz					
	1	1	= 256kHz					
Parameter No	7	6	5	4	3	2	1	0
P009	TMF				TFIN			
	TMF : time from M/S/T code issue to MF/SF/TF issue							
	TFIN : minimum width of signal FIN for valid reception							
	0 0 0 0 = 16ms							
	0 0 0 1 = 32ms							
	0 0 1 0 = 48ms							
	 1 1 1 1 = 256ms							
Parameter No	7	6	5	4	3	2	1	0
P010	APRS	WSFT				OFFV		ISOT
	APRS	0 : automatic coordinate system setting is not conducted 1 : automatic coordinate system setting is conducted when manual reference point return is performed						
	WSFT	0 : the work coordinate system is not shifted 1 : the direct measured value input for tool offset is set in the "work shift" memory						
	OFFV	0 : servo alarm is generated when VRDY signal is on before PRDY is issued 1 : servo alarm is not generated even if VRDY is on without PRDY						
	ISOT	0 : rapid traverse is disabled unless reference point return is conducted on the axis 1 : rapid traverse is enabled right after power on even if reference point return on that axis was not conducted						

9. PARAMETERS

9.1. Description parameters system T (cont.)

Parameter No	7	6	5	4	3	2	1	0
P011		G01	SBKM					
	GO1	0 : G00 mode after power on 1 : G01 mode after power on						
	SBKM	0 : single block is not valid for macro commands 1 : single block is valid for macro commands						
Parameter No	7	6	5	4	3	2	1	0
P013	TCW	CWM	ORCW		GOFC	GMOFS	GOFU2	JHD
	TCW, CWM	output code for S analog output 0 0 (+) for M03 / (+) for M04 0 1 (-) for M03 / (-) for M04 1 0 (+) for M03 / (-) for M04 1 1 (-) for M03 / (+) for M04						
	ORCW	0 : (+) output for spindle orientation 1 : (-) output for spindle orientation						
	GOFC	0 : the tool geometry offset is not canceled with the designation of offset No. '0' 1 : the tool geometry offset is also canceled with the designation of offset No. '0'						
	GMOFS	0 : the tool geometry offset is conducted by the shifting of the coordinate system 1 : the tool geometry offset is canceled with vector processing, i.e. tool movement						
	GOFU2	0 : the geometry offset number is designated by the two low order digits of the T code 1 : the geometry offset number is designated by two high order digits of the T code						
	JHD	0 : MPG usage in JOG mode is disabled 1 : MPG usage in JOG mode is enabled						
Parameter No	7	6	5	4	3	2	1	0
P014	MFT	T2T4	WIGA	OFSB				T2
	MFT	0 : when in same block are used M90 and T code, T code is executed 1 : when in same block are used M90 and T code, T code is not executed						
	T2T4	0 : when the T code is designated with a 2 digit value, the two high order digits are regarded as 00, and the T code is set to the 4 digit value 1 : when the T code is designated with a 2 digit value, it is regarded that the two high order digits are equal to the two low order digits and the T code is set to the 4 digit value						
	WIGA	0 : the incremental and absolute designations are possible for both wear offset amount and tool geometry offset amount 1 : setting of the tool wear offset amount is limited to incremental designation, and the setting of the tool geometry offset amount is limited to absolute designation						
	OFSB	0 : tool offset is conducted by the T code block. (The tool geometry offset by the shifting of the coordinate system is conducted by the T code block regardless of this parameter) 1 : tool offset is conducted together with axis movement						
	T2	0 : T code is specified in 4 digits 1 : T code is specified in 2 digits						
Parameter No	7	6	5	4	3	2	1	0
P015	CPRD			MORB		COTZ		OFSLM
	CPRD	0 : least input increment is used when the decimal point is omitted 1 : [mm], [inch] or [sec] is used when the decimal point is omitted						
	MORB	If set (1), using of signal PRC (DGN 103.6) are allowed. See description of DGN 103.6						
	COTZ	0 : the over-travel limit signal (+LZ) is valid 1 : the over-travel limit signal (+LZ) is invalid						
	OFSLM	If set (1), using of offset values over 999.999 are allowed						
Parameter No	7	6	5	4	3	2	1	0
P016			SPAG		NPRD			
	SPAG	0 : a supplementary angle is given in the angle specification in direct drawing dimensions programming 1 : normal angle is given in the angle specification in direct drawing dimensions programming						
	NPRD	0 : decimal point usage is disabled 1 : decimal point usage is enabled						

9. PARAMETERS

9.1. Description parameters system T (cont.)

Parameter No	7	6	5	4	3	2	1	0
P019			M02NR	M30NR		XRC		
	M02NR	0 : M02 returns cursor to the start of the program 1 : M02 does not return cursor to the start of the program						
	M30NR	0 : M30 returns cursor to the start of the program 1 : M30 does not return cursor to the start of the program						
	XRC	0 : X - axis is diameter designation 1 : X - axis is radius designation						
Parameter No	7	6	5	4	3	2	1	0
P020			GIPS					
	GIPS	0 : in-position check is performed (standard setting) 1 : in-position check is not performed (use with care)						
Parameter No	7	6	5	4	3	2	1	0
P024	ILK	QNI	NEGWS	INOUT		SCTO	LR10	IPMC
	ILK	0 : interlock signal per axis direction is invalid 1 : interlock signal per axis direction is valid						
	QNI	0 : automatic selection of tool offset number is not done during offset writing correction mode 1 : automatic selection of tool offset number is done during offset writing correction mode						
	NEGWS	0 : when work shift amount is input in incremental system, sign is not converted 1 : when work shift amount is input in incremental system, sign is converted and input to memory						
	INOUT	0 : outside of the 2nd stored limit is set to the forbidden area 1 : inside of the 2nd stored limit is set to the forbidden area (use with secret parameter)						
	SCTO	0 : spindle SAR signal is not checked 1 : spindle SAR signal is checked						
	LR10	0 : unit is 0.001 mm / 0.0001 inch 1 : unit is 0.01 mm / 0.001 inch (lower resolution)						
	IPMC	0 : PMC-X is not inhibited (standard setting) 1 : PMC-X is inhibited (use with care)						
Parameter No	7	6	5	4	3	2	1	0
P025	CRST	ESFC	ACF	RTCT	ILVL	TAPM	SID	SRL
	CRST	0 : at the time of reference point return, Cf relative coordinate value cleared 1 : at the time of reference point return, Cf relative coordinate value is not cleared						
	ESFC	0 : the feedback pulses in the turning mode in Cf axis control becomes invalid 1 : even in the turning mode (signal COFF is closed) in Cf axis control, the feedback pulse from the position detection becomes effective						
	ACF	0 : signal DRN, GR1, GR2 are set at DGN114 of PMC address 1 : signal DRN, GR1, GR2 are set at DGN123 of PMC address						
	RTCT	0 : in the deep hole drilling cycle (G83-G87) the tool returns by the retract amount in the course of drilling (A type) 1 : in the deep hole drilling cycle (G83-G87) the tool returns to R point level in the course of drilling (B type)						
	ILVL	0 : in the drilling cycle, the initial point level is updated by resetting 1 : in the drilling cycle, no initial point level is updated by resetting						
	TAPM	0 : in the tapping cycle, M03 and M04 are sent out when the spindle rotates CW and CCW 1 : in the tapping cycle, M05 is sent out first when the spindle rotates CW and CCW						
	SID	0 : the spindle indexing direction by M command is plus 1 : the spindle indexing direction by M command is minus						
	SRL	0 : the spindle indexing mode is not released by resetting 1 : the spindle indexing mode is released by resetting						
Parameter No	7	6	5	4	3	2	1	0
P026	ROT10				LIN4	LIN3		
	ROT10	0 : the parameter unit of JOG feed, cutting feed upper limit speed, rapid F0 speed and FL speed for reference point return at the time of inch output for Cs axis is 0.1 deg/min 1 : the parameter unit is 1 deg/min						
	LIN4	0 : the 4 th axis is rotary axis 1 : the 4 th axis is linear axis						
	LIN3	0 : the 3 rd axis is rotary axis 1 : the 3 rd axis is linear axis						

9. PARAMETERS

9.1. Description parameters system T (cont.)

Parameter No	7	6	5	4	3	2	1	0
P028	PSG2	PSG1						PGCHK
	PSG2, PSG1 gear ratio of spindle and pulse coder 0 0 *1 0 1 *2 1 0 *4 1 1 *8							
	PGCHK 0 : absolute coordinates are displayed at PROGRAM CHECK 1 : relative coordinates are displayed at PROGRAM CHECK							
Parameter No	7	6	5	4	3	2	1	0
P029				ADRC				
	ADRC 0 : for the address in chamfering , corner R, and direct drawing dimension programing, use 'C' and 'R' as per the standard specification 1 : use 'I' or 'K', not 'C' or 'R' for the address in chamfering and corner radius R							
Parameter No	7	6	5	4	3	2	1	0
P030	PART			CCLT	FDV	RPV	SPV	MPML
	PART 0 : display of PARTS is disabled 1 : display of PARTS is enabled							
	CCLT 0 : display of CYCLE TIME is disabled 1 : display of CYCLE TIME is enabled							
	FDV 0 : display of FEED OVR is disabled 1 : display of FEED OVR is enabled							
	RPV 0 : display of RAPID OVR is disabled 1 : display of RAPID OVR is enabled							
	SPV 0 : display of SPINDLE OVR is disabled 1 : display of SPINDLE OVR is enabled							
	MPML 0 : display of STEP OVR / MPG OVR is disabled 1 : display of STEP OVR / MPG OVR is enabled							
Parameter No	7	6	5	4	3	2	1	0
P031		GR	BDT	DRN	MLSB	SCMT	SCMN	TCMN
	GR 0 : display selected gear at screen “ POSITION” disabled 1 : display selected gear at screen “ POSITION” enabled							
	BDT 0 : display the state of signal BDT on status line disabled 1 : display the state of signal BDT on status line enabled							
	DRN 0 : display the state of signal DRN on status line disabled 1 : display the state of signal DRN on status line enabled							
	MLSB 0 : display the state of signals MLK and SBK on status line disabled 1 : display the state of signals MLK and SBK on status line enabled							
	SCMT 0 : S code displayed on status line is from feedback (pulse coder with 1024 ppr is required) 1 : S code displayed on status line is the modal S code							
	SCMN 0 : display of current S code on status line is disabled 1 : display of current S code on status line is enabled							
	TCMN 0 : display of current T code on status line is disabled 1 : display of current T code on status line is enabled							
Parameter No	7	6	5	4	3	2	1	0
P032								BCOD
	BCOD 0 : display of current B code on status line is disabled 1 : display of current B code on status line is enabled							
Parameter No	7	6	5	4	3	2	1	0
P040			DMRX			GRDX		
P041			DMRZ			GRDZ		
P042			DMR3			GRD3		
P043			DMR4			GRD4		
	DMRn Detector multiply ratio (of pulses from encoder) for each axis (X, Z, 3 и 4) – see table below							
	GRDn Pulses per revolution of encoder for each axis (X, Z, 3, 4)							

9. PARAMETERS

9.1. Description parameters system T (cont.)

Relation between DMR, CMR and GRD (metric system) CNC.T							
Motion per revolution in mm	Axis	Detecting unit (μm)	CMR	DMR			Capacity of reference counter (GRDn)
				Pulse 2000	Pulse 2500	Pulse 3000	
12 mm	X	1	1 / 0.5			4	12000
	Z	1	1			4	12000
10 mm	X	1	1 / 0.5		4		10000
	Z	1	1		4		10000
8 mm	X	1	1 / 0.5	4			8000
	Z	1	1	4			8000
6 mm	X	1 / 0.5	1	3			6000
	Z	1	1	3			6000
5 mm	X	1 / 0.5	1		2 / 4		5000 / 10000
	Z	1	1		2		5000
4 mm	X	1 / 0.5	1	2 / 4			4000 / 8000
	Z	1	1	2			4000
3 mm	X	1 / 0.5	1	1.5 / 3		1 / 2	3000 / 6000
	Z	1	1	1.5		1	3000
2 mm	X	1 / 0.5	1	1 / 2			2000 / 4000
	Z	1	1	1		1	2000
1 mm	X	0.5	2 / 1	1			2000 / 4000
	Z	0.5	2	1		1	2000

Relation between DMR, CMR and GRD (inch system) CNC.T							
Motion per revolution in inch	Axis	Detecting unit (μm)	CMR	DMR			Capacity of reference counter (GRDn)
				Pulse 2000	Pulse 2500	Pulse 3000	
0.6 inch	X	1 / 0.5	1	3		2 / 4	12000
	Z	1	1	3		2	12000
0.5 inch	X	1 / 0.5	1		2 / 4		5000 / 10000
	Z	1	1		2		5000
0.4 inch	X	1 / 0.5	1	2 / 4			4000 / 8000
	Z	1	1	2			4000
0.3 inch	X	1 / 0.5	1	1.5 / 3		1 / 2	3000 / 6000
	Z	1	1	1.5		1	3000
0.25 inch	X	1 / 0.5	1		1 / 2		5000
	Z	1	2		2		5000
0.2 inch	X	1 / 0.5	1	1 / 2			2000 / 4000
	Z	1	1	2			2000
0.15 inch	X	0.5	2	1.5		1	3000
	Z	0.5	2	1.5		1	3000
0.1 inch	X	0.5	2	1			2000
	Z	0.5	2	1			2000

DMRn Bit No			Multiplier DMR
6	5	4	
0	X	X	1
1	0	0	4
1	0	1	3
1	1	0	2
1	1	1	4

GRDn Bit No				Counter capacity
3	2	1	0	
0	0	0	1	2000
0	0	1	0	3000
0	0	1	1	4000
0	1	0	0	5000
0	1	0	1	6000
0	1	1	1	8000
1	0	0	1	10000

9. PARAMETERS

9.1. Description parameters system T (cont.)

Parameter No	7	6	5	4	3	2	1	0
P049						ADSI	MPGC	
	ADSI	0 : disable display the state of signals INP, FIN, OVZ, ILK, SCT on status line 1 : display the state of signals INP, FIN, OVZ, ILK, SCT on status line						
	MPGC	0 : disable moving cursor with MPG on AUTO, MDI, EDIT 1 : enable moving cursor with MPG on AUTO, MDI, EDIT						
P080								UMG0
P081								UMG1
P082								UMG2
P083								UMG3
P084								UMG4
P085								UMG5
P086								UMG6
P087								UMG7
P088								UMG8
P089								UMG9
	UMG0 – UMG9 : Set up to 10 G codes calling custom macro UMGn Calls program number O901n							
P090								UMM0
P091								UMM1
P092								UMM2
P093								UMM3
P094								UMM4
P095								UMM5
P096								UMM6
P097								UMM7
P098								UMM8
P099								UMM9
	UMM0 – UMM9 : Set up to 10 M codes calling custom macro UMMn Calls program number O902n							
P100								WORK_HIS
	WORK_HIS	define the work shift time at screen "WORK HISTORY"						
P101								TLMAX
	TLMAX	maximum value of tool selection number Setting value: 0 – 99						
P107								CHKSPD
	CHKSPD	Defines the fluctuation [%] of spindle speed at which signal SSAL (DGN177.7) becomes '1' Setting range: 0-100						
P108								SPLOW
	SPLOW	spindle speed during spindle orientation (signal SOR is active) Setting range: 0 – 255 [rpm]						
P109								THDCH
	THDCH	width of chamfering for thread cutting cycle in G92 Setting range: 0 – 127 [0.1 of lead]						
P110								SCTTIM
	SCTTIM	time from execution of the S function to the beginning of checking the SAR signal Setting range: 0 – 255 [msec]						
P111								MBUF1
P112								MBUF2
	MBUF1, MBUF2	Up to two M codes which will inhibit buffering of the next block. When '03', M03 will inhibit buffering in next block						
P113								PSORGX
P114								PSORGZ
	PSORGX, PSORGZ	Grid numbers at the reference point of X and Z axes respectively Setting range: 0 – 255						
P115								CCLMP
	CCLMP	M - code of C-axis clamp in the drilling cycle Setting range: 0 – 99						

9. PARAMETERS

9.1. Description parameters system T (cont.)

Parameter No	
P117	OFCMP
	OFCMP Offset compensation value Setting value: 0 – 32
P118	TLCMP
	TLCMP tool selection number compensation value Setting value: 0 – 99
P119	OFMAX
	OFMAX maximum value of offset number Setting value: 0 – 32
P120	MAXBDS
	MAXBDS Serial transfer speed 0 : 115200 bps (default) 4 : 4800 bps 9 : 9600 bps 19 : 19200 bps 57 : 57600 bps 115 : 115200 bps
P121	MULHPG
	MULHPG multiplier for the MPG pulses Setting range: 1 – 127
P122	OFSNO
	OFSNO setting of tool offset number in tool offset value at direct input function Setting value: 1 – 32
P123	GRFXT
	GRFXT Graphics coordinate system settings Setting value: 1 – 4
P124	CMRX
P125	CMRZ
P126	CMR3
P127	CMR4
	CMRn Command multiply ratio for each axis 1 : 0.5 2 : 1 4 : 2 10 : 5 20 : 10
P172 – P179	GPS000 – GPS007
P180 – P187	GPS010 – GPS017
P188 – P195	GPS020 – GPS027
P196 – P203	GPS030 – GPS037
P204 – P211	GPS040 – GPS047
P212 – P219	GPS050 – GPS057
P220 – P227	GPS060 – GPS067
P228 – P235	GPS070 – GPS077
P236 – P243	GPS080 – GPS087
P244 – P251	GPS090 – GPS097
P252 – P259	GPS100 – GPS107
P260 – P267	GPS110 – GPS117
P268 – P275	GPS120 – GPS127
P276 – P283	GPS130 – GPS137
P284 – P291	GPS140 – GPS291
P292 – P299	GPS150 – GPS157
	GPS000 – GPS007 : Name (8 characters) of the general purpose switch #1 GPS010 – GPS017 : Name (8 characters) of the general purpose switch #2 GPS150 – GPS157 : Name (8 characters) of the general purpose switch #16 Setting value: 32 – 255 (8 bits ASCII code). When parameter is '0' - means this is end of name. If first symbol of name is '0' the switch is not shown.

9. PARAMETERS

9.1. Description parameters system T (cont.)

Parameter No	
P500 – P503	MCMRX, MCMRZ, MCMR3, MCMR4
	MCMRn Optional multiplier for CMR for each axis. This function is enables if OCMR (Setup Options P009.7) = '1'
P508 – P511	DCMRX, DCMRZ, DCMR3, DCMR4
	DCMRn Optional divider for CMR for each axis. This function is enables if OCMR (Setup Options P009.7) = '1'
P516	PSANG
	PSANG Gain adjustment in spindle analog output Setting range: 700 – 1250 Standard setting 1000
P517	LPGIN
	LPGIN Servo loop gain in position control Setting range: 1 – 9999 [0.01/sec] Standard setting 3000 (G = 30)
P526	THRDT
	THRDT the time constant value of X axis in thread cutting cycle (G92 and G76) Setting range: 1 – 4000 [msec]
P527	FEDMX
	FEDMX upper speed limit of cutting feed (common to X, Z, 3, 4 axes) Setting range: 6 – 30000 [mm/min] 6 – 12000 [0.1 inch/min]
P528	THDFL
	THDFL the lower limit value (FL) of X axis acceleration deceleration in thread cutting cycle (G92 and G76) Setting range: 6 – 15000 [mm/min] 6 – 6000 [0.1 inch/min]
P529	FEEDT
	FEEDT time constant of exponential acceleration / deceleration in cutting feed Setting range: 1 – 4000 [msec]
P530	FEDFL
	FEDFL lower limit of feed rate in exponential acceleration / deceleration Setting range: 6 – 15000 [mm/min] 6 – 6000 [0.1 inch/min]
P531	SPALW
	SPALW tolerance (in %) at which the actual spindle speed is regarded to reach the command value in the spindle speed fluctuation detection (G25 and G26) Setting range: 1 – 100%
P532	SPLMT
	SPLMT spindle speed fluctuation (in %) at which alarm is indicated in the detection of spindle speed fluctuation (G25 and G26) Setting range: 1 – 100%
P533	RPDFL
	RPDFL speed when rapid traverse override is F0 (common to all axes) Setting range: 6 – 15000 [mm/min] 6 – 6000 [0.1 inch/min]
P534	ZRNFL
	ZRNFL low feed speed at reference point return(common to all axes) Setting range: 6 – 15000 [mm/min] 6 – 6000 [0.1 inch/min]
P535	FEEDTJOG
	FEEDTJOG time constant of exponential acceleration / deceleration in cutting feed (common to all axes) Setting range: 1 – 4000 [msec]
P539	SPDLC
	SPDLC spindle speed offset compensation value at zero speed Setting range: 1 – 8192 [velo]
P540	GRMX1
P541	GRMX2
P542	GRMX3
P543	GRMX4
	GRMX1 – GRMX4 : Maximum spindle speed at 1, 2, 3 and 4 gear. Setting range: 0 – 9999 [rpm]

9. PARAMETERS

9.1. Description parameters system T (cont.)

Parameter No	
P548	JOGFL
	JOGFL lower limit of jog feed in exponential acceleration / deceleration Setting range: 6 – 15000 [mm/min] 6 – 6000 [0.1 inch/min]
P551	LOWSP
	LOWSP minimum spindle speed in constant surface speed control mode (G96) Setting range: 1 – 9999 [rpm]
P556	SCLMP
	SCLMP upper limit of spindle, valid for G96 and G97 Setting range: 1 – 9999 [rpm]
P557	CRCDL
	CRCDL limitation of ignoring a small movement amount when the tool moves along the outside of an acute angle close to 90 degree during cutter radius compensation Setting range: 6 – 16384 [0.001 mm] 6 – 6000 [0.0001 inch]
P558	ACALFL
	ACALFL feedrate during measuring in automatic tool compensation function (common for all axes) Setting range: 6 – 15000 [mm/min] 6 – 6000 [0.1 inch/min]
P565	JOGF
	JOGF jog feed rate for linear axes in feed rate type B Setting range: 1 – 2000 [mm/min] 1 – 800 [0.1 inch/min]
P570	SPIDS
	SPIDS Spindle orientation speed Setting range: 0 – 4095 [0.5461 rpm]
P571	SPIDX
	SPIDX Spindle orientation angle Setting range: 0 – 4095 [11.3778 degree]
P572	SLPGM
	SLPGM Spindle loop gain in orientation $SLPGM = 2048 \cdot (E/L) \cdot a \cdot 1000$ E – output of tachogenerator at 1000 rpm L – angle of rotation of spindle nose for one round of motor A – minimum increment in [degree]
P573	SLPGIN
	SLPGIN Spindle loop gain when orientation completed Setting range: 0 – 9999 [1 / sec]
P574	SPDINP
	SPDINP Spindle in position when orientation is performed
P575	SPDEV
	SPDEV Minimum speed deviation of spindle speed to start orientation (pulses from encoder)
P580	INPX
P581	INPZ
P582	INP3
P583	INP4
	INPX – INP4 in-position width for each axis(X, Z, 3, 4) Setting range: 0 – 32767 [imp] Standard setting 20 (metric system); 12 (inch system)
P588	SERRX
P589	SERRZ
P590	SERR3
P591	SERR4
	SERRX – SERR4 limitation value of position deviation for each axis during movement Setting range: 0 – 32767 [imp] $SERRn = (Fmax/G) \cdot 1.5$ Fmax – maximum velocity [imp/sec] G – 30 [1 / sec]

9. PARAMETERS

9.1. Description parameters system T (cont.)

Parameter No	
P596	STPEX
P597	STPEZ
P598	STPE3
P599	STPE4
STPEX – STPE4 limitation value of position deviation for each axis during stop (X, Z, 3, 4) Setting range: 0 – 32767 [imp]	
P604	GRDSX
P605	GRDSZ
P606	GRDS3
P607	GRDS4
GRDSX – GRDS4 grid shift amount for each axis (X, Z, 3, 4) Setting range: -327670 – +32767 [imp]	
P612	LPGMX
P613	LPGMZ
P614	LPGM3
P615	LPGM4
LPGMX – LPGM4 loop gain multiplier for each axis $LPGMn = 20048 * (E / L) * a * 1000$ 0 – 32767 [imp] E - tachometer voltage when motor is at 1000 rpm [V] L – axis movement per motor revolution [mm or inch] A – detection unit [mm or inch]	

Values for LPGMn		
Ballscrew pitch	Servomotor 7V/1000 rpm	Servomotor 7V/2000 rpm
10 mm	1434	717
8 mm	1792	896
6 mm	2389	1195
5 mm	2867	1434
4 mm	3584	1792
3 mm	4779	2389
2 mm	7168	3584
1 mm	7168	3584
0.5 inch	2867	1434
0.4 inch	3584	1792
0.3 inch	4779	2389
0.25 inch	2867	1434
0.2 inch	7168	2389
0.15 inch	4779	3584
0.1 inch	7168	3584

P620	LINTX
P621	LINTZ
P622	LINT3
P623	LINT4
LINTX – LINT4 time constant of linear acceleration / deceleration for each axis during rapid traverse (X, Z, 3, 4) Setting range: 8 – 4000 [msec]	
P628	RPDFX
P629	RPDFZ
P630	RPDF3
P631	RPDF4
RPDFX – RPDF4 rapid traverse rate for each axis (X, Z, 3, 4) Setting range: 30 – 64000 [mm/min] 30 – 25000 [inch/min]	

9. PARAMETERS

9.1. Description parameters system T (cont.)

Parameter No	
P636	RPDJX
P637	RPDJZ
P638	RPDJ3
P639	RPDJ4
	RPDJX – RPDJ4 rapid traverse rate in JOG mode for each axis (X, Z, 3, 4) Setting range: 30 – 64000 [mm/min] 30 – 25000 [inch/min] If these parameters are '0' then valid are parameters P628 – P631
P644	BKLX
P645	BKLZ
P646	BKL3
P647	BKL4
	BKLX – BKL4 backlash compensation amount for each axis (X, Z, 3, 4) Setting range: 0 – 255 [0.001 mm] 0 – 255 [0.0001 inch]
P652	DRFTX
P653	DRFTZ
P654	DRFT3
P655	DRFT4
	DRFTX – DRFT4 compensation amount of servo loop drift for each axis (X, Z, 3, 4) Setting range: -1023 – +1023 [mV]
P680	SLPGM1
P681	SLPGM2
P682	SLPGM3
P683	SLPGM4
	SLPGMn servo loop gain multiplier of spindle for each gear (1 to 4) $SLPGMn = 2048 \cdot (E/L) \cdot a \cdot 1000$ E - tachometer voltage at 1000 rpm [V] L – angle per spindle motor rotation (normally 360) A – detection unit [degree]
P684	SLPGIN
	SLPGIN Spindle loop gain (common at all gears) Setting range: 0 – 9999 [1/sec]
P685	SRPDL
	SRPDL minimum speed of spindle when rapid traverse override (F0) Setting range: 660 – 15000 [deg/min]
P686	SZRNL
	SZRNL Low speed in spindle orientation Setting range: 660 – 15000 [deg/min]
P687	MORT
	MORT spindle orientation M code Setting range: 6 – 97
P688	MERES
	MERES M code for spindle orientation cancel Setting range: 6 – 97
P689	MSINDX
	MSINDX M code initial value of M code call Setting range: 6 – 92
P690	MSDEG
	MSDEG base rotation angle of M code call Setting range: 1 – 60 [deg]
P691	PDWEL
	PDWEL Dwell time during specification unclamp of C-axis in the machining cycle Setting range: 0 – 32767 [msec]
P699	SRAM
	SRAM define the ramp of spindle command Setting range: 0 – 100 (When 0 no ramp is used, when 100 ramp is a maximum)

9. PARAMETERS

9.1. Description parameters system T (cont.)

Parameter No	
P712	SPTIME
	SPTIME Delay before starting of spindle speed check (in G25, G26) Setting range: 0 – 9999999 [msec]
P713	PSGRDX
P714	PSGRDZ
	PSGRDX, PSGRDZ grid width of X and Z axes, respectively (see also parameters P113 and P114). No position signal is output when the setting value is 0. In order to output the position signal securely without any skip when each axis moves at the maximum setting value 64 m/min of the rapid traverse speed, the grid width must be set to be not less than 6400. Setting range: 0 – 999999 [0.001 mm] 0 – 999999 [0.0001 inch]
P717	MRCCD
	MRCCD depth of cut in multiple repetitive cycle G71, G72. Setting range: 1 – 999999 [0.001 mm] 1 – 999999 [0.0001 inch]
P718	MRCDT
	MRCDT relief amount in multiple repetitive cycles G71, G72 Setting range: 1 – 999999 [0.001 mm] 1 – 999999 [0.0001 inch]
P719	PESCX
P720	PES CZ
	PESCX, PES CZ relief values in X and Z directions in multiple repetitive cycle G73, respectively Setting range: 0 – 999999 [0.001 mm] 0 – 999999 [0.0001 inch]
P721	PATIM
	PATIM number of division in multiple repetitive cycle G73 Setting range: 0 – 9999999
P722	GROVE
	GROVE return amount in multiple repetitive cycle G74, G75 Setting range: 0 – 9999999 [0.001 mm] 0 – 9999999 [0.0001 inch]
P723	THRPT
	THRPT number of repetitions of final finishing in multiple repetitive cycle G76 Setting range: 1 – 9999999
P724	THANG
	THANG tool nose angle in multiple repetitive cycle G76 Setting values: 0, 29, 30, 55, 60, 80
P725	THCLM
	THCLM minimum depth of cut in multiple repetitive cycle G76 Setting range: 0 – 9999999 [0.001 mm] 0 – 9999999 [0.0001 inch]
P726	THDFN
	THDFN finishing allowance in multiple repetitive cycle G76 Setting range: 0 – 9999999 [0.001 mm] 0 – 9999999 [0.0001 inch]
P728	WIMAX
	WIMAX sets the tolerance value of tool wear offset incremental input Setting range: 1 – 9999999 [0.001 mm] 1 – 9999999 [0.0001 inch]
P729	WOMAX
	WOMAX sets the maximum of the tool offset value Setting range: 1 – 9999999 [0.001 mm] 1 – 9999999 [0.0001 inch]
P730	MIRSS
	MIRSS used for mirror image for opposite tool post. This parameter sets the distance between the tool posts in the shifting of coordinate system Setting range: 1 – 9999999 [0.001 mm] radius value 1 – 9999999 [0.0001 inch] radius value

9. PARAMETERS

9.1. Description parameters system T (cont.)

Parameter No	
P731	GANMAX
P732	GANMAZ
	GANMAX, GANMAZ the value of ε on the X and Z axes in the automatic tool compensation function, respectively in G36, G37 Setting range: 1 – 9999999 [0.001 mm] 1 – 9999999 [0.0001 inch] The X axis value is a radius value
P733	EPCX
P734	EPCZ
	EPCX, EPCZ the value of γ on the X and Z axes in the automatic tool compensation function, respectively in G36, G37 Setting range: 1 – 9999999 [0.001 mm] 1 – 9999999 [0.0001 inch] The X axis value is a radius value
P743	TLSXP
P744	TLSXM
P745	TLSZP
P746	TLSXM
	TLSXP distance from the measurement standard point to contact surface X_p (+) TLSXM distance from the measurement standard point to contact surface X_m (-) TLSZP distance from the measurement standard point to contact surface Z_p (+) TLSZM distance from the measurement standard point to contact surface Z_m (-) Setting range: 1 – 9999999 [0.001 mm] 1 – 9999999 [0.0001 inch]
P747	LT2X1
P748	LT2Z1
P749	LT231
P750	LT241
P751	LT2X2
P752	LT2Z2
P753	LT232
P754	LT242
	LT2X1, LT2X2 Second work zone for X axis LT2Z1, LT2Z2 Second work zone for Z axis LT231, LT232 Second work zone for 3 axis LT241, LT242 Second work zone for 4 axis Used with secret parameter
P756	PRSX
P757	PRSZ
P758	PRS3
P759	PRS4
	PRSX – PRS4 coordinate values of the reference point when automatic coordinate system setting is conducted Setting range: -9999999 – +9999999 [0.001 mm] -9999999 – +9999999 [0.0001 inch]
P772	REF2X
P773	REF2Z
P774	REF23
P775	REF24
	REF2X – REF24 distance from reference point to the second reference point for each axis Setting range: -9999999 – +9999999 [0.001 mm] -9999999 – +9999999 [0.0001 inch]

9. PARAMETERS

9.1. Description parameters system T (cont.)

Parameter No	
P780	LT1MAXX
P781	LT1MAXZ
P782	LT1MAX3
P783	LT1MAXX
P788	LT1MINX
P789	LT1MINZ
P790	LT1MIN3
P791	LT1MIN4
	LT1MAXX – Maximum axis traverse limit LT1MAX4 LT1MINX – Minimum axis traverse limit LT1MIN4 These parameters specify the region of allowed machine movement. Moving the machine beyond it will cause an overtravel alarm. For each axis set the distance from reference point to the limits. Setting range: -9999999 – +9999999 [0.001 mm] -9999999 – +9999999 [0.0001 inch]
P840	DGNBYTE
	DGNBYTE set the number of bytes displayed from DGN 300 in decimal format
P841	DGNWORD
	DGNWORD set the number of words displayed in decimal at DGN area after area, specified by parameter 840
P842	DGNTIMER
	DGNTIMER set the number of timers displayed in decimal at DGN area after area, specified by parameter 841
P843	DGNCOUNTER
	DGNCOUNTER set the number of counters displayed in decimal at DGN area after area, specified by parameter P842

Note: Parameters not specified in this manual must be not used and set to '0'.

9. PARAMETERS

9.2. Description parameters system M

Параметри CNC.M								
Parameter No	7	6	5	4	3	2	1	0
P001	ADFT	RDRN	DECI	SXDIR	RS43	DCS		SCW
	ADFT 0 : Automatic drift compensation is OFF 1 : Automatic drift compensation is ON							
	RDRN 0 : Signal DRN is NOT effective in rapid traverse 1 : Signal DRN is effective in rapid traverse							
	DECI 0 : Active state of deceleration signal (DEC) for all axis is '0' 1 : Active state of deceleration signal (DEC) for all axis is '1'							
	SXDIR 0 : spindle indexing direction is (+) 1 : spindle indexing direction is (-)							
	RS43 0 : offset vector in G43/G44 is cleared upon reset 1 : offset vector in G43/G44 remains in reset state							
	DCS 0 : [START/OUTPUT] button goes through PMC-X 1 : [START/OUTPUT] button starts immediately in MDI mode							
	SCW 0 : machine screw is metric 1 : machine screw is inch							
Parameter No	7	6	5	4	3	2	1	0
P002		TJHD	PMXY2	PMXY1			PPD	ADSP
	TJHD 0 : MPG usage in TJOG mode is disabled 1 : MPG usage in TJOG mode is enabled							
	PMXY2, PMXY1 : shift direction in canned cycles G76,G87 0 0 = +X 0 1 = -X 1 0 = +Y 1 1 = -Y							
	PPD 0 : relative coordinate system is not preset when the coordinate system is set 1 : relative coordinate system is preset when the coordinate system is set							
	ADSP 0 : programs sent through serial interface are without separators between words 1 : programs sent through serial interface are with separators between words							
Parameter No	7	6	5	4	3	2	1	0
P003	AFD	TLCP	GST					
	AFD 0 : Automatic deceleration at the end of block is disabled 1 : Automatic deceleration at the end of block is enabled							
	TLCP 0 : tool length offset is performed in Z axis only irrespective of plane selection 1 : tool length offset is performed in the axis being normal to the plane selected by G17/G18/G19							
	GST 0 : spindle orientation is done by the SOR signal 1 : gear shift is done by the SOR signal							
Parameter No	7	6	5	4	3	2	1	0
P008	EILK	OTZN			STP10	ZRNA	CPF2	CPF1
	EILK 0 : interlock is performed for all axes or for Z axis only (see P012.2) 1 : interlock is performed for each axis separately							
	OTZN 0 : Z axis stroke check is performed 1 : Z axis stroke check is not performed							
	STP10 0 : MPG pulses multiply in HNDL (1, 10, P121) 1 : MPG pulses multiply in HNDL (10, 100, 1000, 10000)							
	ZRNA 0 : Only one axis can be moved in JOG and ZRN 1 : All axis can be moved in JOG and ZRN							
	CPF2, CPF1 : backlash compensation pulse frequency 0 1 = 64kHz 1 0 = 128kHz 1 1 = 256kHz							

9. PARAMETERS

9.2. Description parameters system M (cont.)

Parameter No	7	6	5	4	3	2	1	0
P009	TMF				TFIN			
	TMF : time from M/S/T code issue to MF/SF/TF issue TFIN : minimum width of signal FIN for valid reception 0 0 0 0 = 16ms 0 0 0 1 = 32ms 0 0 1 0 = 48ms 1 1 1 1 = 256ms							
Parameter No	7	6	5	4	3	2	1	0
P010						OFFV	FBRD	ISOT
	OFFV 0 : servo alarm is generated when VRDY signal is on before PRDY is issued 1 : servo alarm is not generated even if VRDY is on without PRDY							
	FBRD 0 : Reverse decoding of program is not allowed and MACRO B is disabled 1 : Reverse decoding of program is allowed and MACRO B is enabled (special software)							
	ISOT 0 : rapid traverse is disabled unless reference point return is conducted on the axis 1 : rapid traverse is enabled right after power on even if reference point return on that axis was not conducted							
Parameter No	7	6	5	4	3	2	1	0
P011	LDRN	G01	SBKM	MCF	ADNW	ADLN	PML2	PML1
	LDRN 0 : DRN sets standard feed of motion 1 : DRN sets feed of motion for laser machines (max 3000 [mm/min])							
	G01 0 : G00 mode after power on 1 : G01 mode after power on							
	SBKM 0 : single block is not valid for macro commands 1 : single block is valid for macro commands							
	MCF 0 : EF signal is not generated in G81 1 : EF signal is output when G81 positioning is not completed							
	ADNW 0 : feed rate is type A 1 : feed rate is type B							
	ADLN 0 : Maximum feed rate is 15000 [mm/min] 1 : Maximum feed rate is 30000 [mm/min]							
	PML2, PML1 : pitch error compensation magnification 0 0 = x1 0 1 = x2 1 0 = x4 1 1 = x8							
Parameter No	7	6	5	4	3	2	1	0
P012	SPAM	G84S	FXCO	FXCS			ZILK	
	SPAM 0 : automatic spindle gear 1 : manual spindle gear							
	G84S 0 : canned cycles G74/G84 are type A 1 : canned cycles G74/G84 are type B							
	FXCO 0 : in G76/G87 canned cycles oriented spindle stop is performed after outputting M05 1 : in G76/G87 canned cycles oriented spindle stop is performed without outputting M05							
	FXCS 0 : in G76/G87 canned cycles spindle rotation is performed after outputting M05 1 : in G76/G87 canned cycles spindle rotation is performed without outputting M05							
	ZILK 0 : INTERLOCK is effective for all axes 1 : INTERLOCK is effective for Z axis only							
Parameter No	7	6	5	4	3	2	1	0
P013	TCW	CWM	ORCW					JHD
	TCW, CWM output code for S analog output 0 0 (+) for M03 / (+) for M04 0 1 (-) for M03 / (-) for M04 1 0 (+) for M03 / (-) for M04 1 1 (-) for M03 / (+) for M04							
	ORCW 0 : (+) output for spindle orientation 1 : (-) output for spindle orientation							
	JHD 0 : MPG usage in JOG mode is disabled 1 : MPG usage in JOG mode is enabled							

9. PARAMETERS

9.2. Description parameters system M (cont.)

Parameter No	7	6	5	4	3	2	1	0
P014	MFT	T2T4						
	MFT	0 : when in same block are used M90 and T code, T code is executed 1 : when in same block are used M90 and T code, T code is not executed						
	T2T4	0 : when the T code is designated with a 2 digit value, the two high order digits are regarded as 00, and the T code is set to the 4 digit value 1 : when the T code is designated with a 2 digit value, it is regarded that the two high order digits are equal to the two low order digits and the T code is set to the 4 digit value						
Parameter No	7	6	5	4	3	2	1	0
P015	CPRD	DOVC			SKPF	RILK		
	CPRD	0 : least input increment is used when the decimal point is omitted (0.001mm / 0.0001 inch) 1 : [mm], [inch] or [sec] is used when the decimal point is omitted						
	DOVC	0 : overcutting alarm is enabled in tool radius compensation 1 : overcutting alarm is disabled in tool radius compensation						
	SKPF	0 : dry run, override and automatic acceleration / deceleration are ineffective in G31 1 : dry run, override and automatic acceleration / deceleration are effective in G31						
	RILK	0 : normal INTERLOCK processing 1 : high-speed INTERLOCK processing						
Parameter No	7	6	5	4	3	2	1	0
P016					NPRD	SUPM		
	NPRD	0 : decimal point usage is enabled 1 : decimal point usage is disabled						
	SUPM	0 : start-up type A for CRC-C 1 : start-up type B for CRC-C						
Parameter No	7	6	5	4	3	2	1	0
P019			M02NR					
	M02NR	0 : M02 returns cursor to the start of the program 1 : M02 does not return cursor to the start of the program						
Parameter No	7	6	5	4	3	2	1	0
P020			GIPS	BCD3				
	GIPS	0 : in-position check is performed (standard setting) 1 : in-position check is not performed (use with care)						
	BCD3	0 : B code is 6-digit number 1 : B code is 3-digit number						
Parameter No	7	6	5	4	3	2	1	0
P021	CHZRN							
	CHZRN	0 : pulse coder is checked on each reference point return and servo alarm #403 is generated on failure (standard setting) 1 : pulse coder is not checked on reference point return (use with care)						
Parameter No	7	6	5	4	3	2	1	0
P024			UWKZ			SCTO	LR10	IPMC
	UWKZ	0 : after modification the absolute coordinate value is updated on the initial preprocessing 1 : when the work zero point offset value is modified, absolute coordinate value is changed at once						
	SCTO	0 : spindle SAR signal is not checked 1 : spindle SAR signal is checked						
	LR10	0 : unit is 0.001 mm / 0.0001 inch 1 : unit is 0.01 mm / 0.001 inch (lower resolution)						
	IPMC	0 : PMC-X is not inhibited (standard setting) 1 : PMC-X is inhibited (use with care)						
Parameter No	7	6	5	4	3	2	1	0
P028	PSG2	PSG1						PGCHK
	PSG2, PSG1	gear ratio of spindle and it's encoder 0 0 *1 0 1 *2 1 0 *4 1 1 *8						
	PGCHK	0 : absolute coordinates are displayed at PROGRAM CHECK 1 : relative coordinates are displayed at PROGRAM CHECK						

9. PARAMETERS

9.2. Description parameters system M (cont.)

Parameter No	7	6	5	4	3	2	1	0
P029	UD8	UD7	UD6	UD5	UD4	UDZ	UDY	UDX
	UDX – UD8 approach direction for G60 0 : (+) direction 1 : (-) direction							
Parameter No	7	6	5	4	3	2	1	0
P030	PART			CCLT	FDV	RPV	SPV	MPML
	PART 0 : display of PARTS is disabled 1 : display of PARTS is enabled							
	CCLT 0 : display of CYCLE TIME is disabled 1 : display of CYCLE TIME is enabled							
	FDV 0 : display of FEED OVR is disabled 1 : display of FEED OVR is enabled							
	RPV 0 : display of RAPID OVR is disabled 1 : display of RAPID OVR is enabled							
	SPV 0 : display of SPINDLE OVR is disabled 1 : display of SPINDLE OVR is enabled							
	MPML 0 : display of STEP OVR / MPG OVR is disabled 1 : display of STEP OVR / MPG OVR is enabled							
Parameter No	7	6	5	4	3	2	1	0
P031		GR	BDT	DRN	MLSB	SCMT	SCMN	TCMN
	GR 0 : display selected gear at screen " POSITION" disabled 1 : display selected gear at screen " POSITION" enabled							
	BDT 0 : display the state of signal BDT on status line disabled 1 : display the state of signal BDT on status line enabled							
	DRN 0 : display the state of signal DRN on status line disabled 1 : display the state of signal DRN on status line enabled							
	MLSB 0 : display the state of signals MLK and SBK on status line disabled 1 : display the state of signals MLK and SBK on status line enabled							
	SCMT 0 : S code displayed on status line is from feedback (pulse coder with 1024 ppr is required) 1 : S code displayed on status line is the modal S code							
	SCMN 0 : display of current S code on status line is disabled 1 : display of current S code on status line is enabled							
	TCMN 0 : display of current T code on status line is disabled 1 : display of current T code on status line is enabled							
Parameter No	7	6	5	4	3	2	1	0
P032								DVAR
	DVAR 0 : display of controller variable on status line is disabled 1 : On status line is displayed controller variable. Name of variable is ASCII code of P139, value is DGN108 and type is specified by P138.							
Parameter No	7	6	5	4	3	2	1	0
P040			DMRX				GRDX	
P041			DMRY				GRDY	
P042			DMRZ				GRDZ	
P043			DMR3				GRD3	
P044			DMR4				GRD4	
P045			DMR5				GRD5	
P046			DMR6				GRD6	
	DMRn Detector multiply ratio (of pulses from encoder) for each axis (X, Y, Z, 3, 4, 5 и 6) – see table below							
	GRDn Pulses per revolution of encoder for each axis (X, Z, 3, 4)							

9. PARAMETERS

9.2. Description parameters system M (cont.)

Relation between DMR, CMR and GRD (metric system) CNC.M						
Motion per revolution in mm	Detecting unit (μm)	CMR	DMR			Capacity of reference counter (GRDn)
			Pulse 2000	Pulse 2500	Pulse 3000	
12 mm	1	1			4	6000
10 mm	1	1		4		10000
8 mm	1	1	4			8000
6 mm	1	1	3			6000
5 mm	1	1		2		5000
4 mm	1	1	2			4000
3 mm	1	1	1.5		1	3000
2 mm	1	1	1			2000
1 mm	0.5	2	1			2000

Relation between DMR, CMR and GRD (inch system) CNC.M						
Motion per revolution in inch	Detecting unit (μm)	CMR	DMR			Capacity of reference counter (GRDn)
			Pulse 2000	Pulse 2500	Pulse 3000	
0.6 inch	1	1	3		2	6000
0.5 inch	1	1		2		5000
0.4 inch	1	1	2			4000
0.3 inch	1	1	1.5		1	3000
0.25 inch	0.5	2		2		5000
0.2 inch	1	1	1			2000
0.15 inch	0.5	2	1.5		1	3000
0.1 inch	0.5	2	1			2000

DMRn Bit No			Multiplier DMR
6	5	4	
0	X	X	1
1	0	0	4
1	0	1	3
1	1	0	2
1	1	1	4

GRDn Bit No				Counter capacity
3	2	1	0	
0	0	0	1	2000
0	0	1	0	3000
0	0	1	1	4000
0	1	0	0	5000
0	1	0	1	6000
0	1	1	1	8000
1	0	0	1	10000

Parameter No	7	6	5	4	3	2	1	0
P049					TPMC	ADSI	MPGC	
TPMC 0 : On screen is displayed current T code 1 : On screen is displayed T code, set by PMC in DGN106 This parameter is active if P031.0 = '1'								
ADSI 0 : disable display the state of signals INP, FIN, OVZ, ILK, SCT on status line 1 : display the state of signals INP, FIN, OVZ, ILK, SCT on status line								
MPGC 0 : disable moving cursor with MPG on AUTO, MDI, EDIT 1 : enable moving cursor with MPG on AUTO, MDI, EDIT								

9. PARAMETERS

9.2. Description parameters system M (cont.)

Parameter No	
P080	UMG0
P081	UMG1
P082	UMG2
P083	UMG3
P084	UMG4
P085	UMG5
P086	UMG6
P087	UMG7
P088	UMG8
P089	UMG9
	UMG0 – UMG9 : Set up to 10 G codes calling custom macro UMGn Calls program number O901n
P090	UMM0
P091	UMM1
P092	UMM2
P093	UMM3
P094	UMM4
P095	UMM5
P096	UMM6
P097	UMM7
P098	UMM8
P099	UMM9
	UMM0 – UMM9 : Set up to 10 M codes calling custom macro UMMn Calls program number O902n
P100	WORK_HIS
	WORK_HIS define the work shift time at screen "WORK HISTORY"
P108	SPLOW
	SPLOW spindle speed during spindle orientation / gear shift Setting range: 0 – 255 [об/мин]
P109	
P110	SCTTIM
	SCTTIM time from execution of the S function to the beginning of checking the SAR signal Диапазон: 0 – 255 [msec]
P111	MBUF1
P112	MBUF2
	MBUF1, Up to two M codes which will inhibit buffering of the next block. MBUF2 When '03', M03 will inhibit buffering in next block
P120	MAXBDS
	MAXBDS Serial transfer speed 0 : 115200 bps (default) 4 : 4800 bps 9 : 9600 bps 19 : 19200 bps 57 : 57600 bps 115 : 115200 bps
P121	MULHPG
	MULHPG multiplier for the MPG pulses [%] Диапазон: 1 – 127
P123	GRFXT
	GRFXT 0: Graphics type is standard 1: Graphics type is special (for gas/plasma cutting machines)

9. PARAMETERS

9.2. Description parameters system M (cont.)

Parameter No	
P124	CMRX
P125	CMRY
P126	CMRZ
P127	CMR4
P128	CMR5
P129	CMR6
	CMRn Command multiply ratio for each axis 1 : 0.5 2 : 1 4 : 2 10 : 5 20 : 10
P138	VTYP
	VTYP Defines type of DGN108, which will displayed on status line 1 : Decimal 2 : Hex 3 : As position 4 : As time
P139	VNAME
	VNAME ASCII code of variable DGN108, which will displayed on status line
P140	POSTNX
P141	POSTNY
P142	POSTNZ
P143	POSTN4
P144	POSTN5
P145	POSTN6
	POSTNX – POSTN6 : approach amount for single direction positioning G60 for each axis Setting range: 0– 255 [0.01mm] или [0.001 inch]
P148	PECORGX
P149	PECORGY
P150	PECORGZ
P151	PECORG4
P152	PECORG5
P153	PECORG6
	PECORGX – PECORG6 : zero point of pitch error compensation for each axis Setting range: 0– 127
P172 – P179	GPS000 – GPS007
P180 – P187	GPS010 – GPS017
P188 – P195	GPS020 – GPS027
P196 – P203	GPS030 – GPS037
P204 – P211	GPS040 – GPS047
P212 – P219	GPS050 – GPS057
P220 – P227	GPS060 – GPS067
P228 – P235	GPS070 – GPS077
P236 – P243	GPS080 – GPS087
P244 – P251	GPS090 – GPS097
P252 – P259	GPS100 – GPS107
P260 – P267	GPS110 – GPS117
P268 – P275	GPS120 – GPS127
P276 – P283	GPS130 – GPS137
P284 – P291	GPS140 – GPS291
P292 – P299	GPS150 – GPS157
	GPS000 – GPS007 : Name (8 characters) of the general purpose switch #1 GPS010 – GPS017 : Name (8 characters) of the general purpose switch #2 GPS150 – GPS157 : Name (8 characters) of the general purpose switch #15 Setting value: 32 – 255 (8 bits ASCII code). When parameter is '0' - means this is end of name. If first symbol of name is '0' the switch is not visualized.

9. PARAMETERS

9.2. Description parameters system M (cont.)

Parameter No	
P500 – P503	MCMRX, MCMRZ, MCMR3, MCMR4
	MCMRn Optional multiplier for CMR for each axis. This function is enables if OCMR (Setup Options P009.7) = '1'
P508 – P511	DCMRX, DCMRZ, DCMR3, DCMR4
	DCMRn Optional divider for CMR for each axis. This function is enables if OCMR (Setup Options P009.7) = '1'
P516	PSANG
	PSANG gain adjustment in spindle analog output Setting range: 700 – 1250 Standard setting 1000
P517	LPGIN
	LPGIN Servo loop gain in position control Setting range: 1 – 9999 [0.01/sec] Standard setting 3000 (G = 30)
P527	FEDMX
	FEDMX upper speed limit of cutting feed (common for all axis) Setting range: 6 – 30000 [mm/min] 6 – 12000 [0.1 inch/min]
P529	FEEDT
	FEEDT time constant of exponential acceleration / deceleration in cutting feed (for all axis) Setting range: 1 – 4000 [msec]
P530	FEDFL
	FEDFL lower limit of feed rate in exponential acceleration / deceleration Диапазон: 6 – 15000 [mm/min] 6 – 6000 [0.1 inch/min]
P531	CYCR
	CYCR relief amount in canned cycle G73 Setting range: 0 – 32767 [0.001 mm] 0 – 32767 [0.0001 inch]
P532	CYCD
	CYCD cutting start point in canned cycle G83 Setting range: 0 – 32767 [0.001 mm] 0 – 32767 [0.0001 inch]
P533	RPDFL
	RPDFL speed when rapid traverse override is F0 (common to all axes) Setting range: 6 – 15000 [mm/min] 6 – 6000 [0.1 inch/min]
P534	ZRNFL
	ZRNFL low feed speed at reference point return(common to all axes) Setting range: 6 – 15000 [mm/min] 6 – 6000 [0.1 inch/min]
P535	FEEDTJOG
	FEEDTJOG time constant of exponential acceleration / deceleration in cutting feed (common to all axes) Setting range: 1 – 4000 [msec]
P539	GR2MAX
	GR2MAX Maximum spindle speed at 2 nd gear. Setting range: 1 – 9999 [rpm]
P540	GR2MIN
	GR2MIN Minimum spindle speed at 2 nd gear. Setting range: 1 – 9999 [rpm]
P541	GR1MAX
	GR1MAX Maximum spindle speed at 1 st gear. Setting range: 1 – 9999 [rpm]
P542	SPDMAX
	SPDMAX: upper limit of command value to the spindle unit Setting range: 1 – 4095 SPDMAX = (Max rpm motor / Max rpm spindle nose) * 4095

9. PARAMETERS

9.2. Description parameters system M (cont.)

Parameter No	
P543	SPDMIN
	SPDMIN : Lower limit of command value to the spindle unit Setting range: 1 – 4095 SPDMIN = (Min rpm motor / Max rpm spindle nose) * 4095
P548	JOGFL
	JOGFL Minimum value of feed speed in exponential acceleration / deceleration Setting range: 6 – 15000 [mm/min] 6 – 6000 [0.1 inch/min]
P549	FINT
	FINT Feed value after initial turn on Setting range: 6 – 15000 [mm/min] 6 – 6000 [0.1 inch/min]
P555	GR3MAX
	GR3MAX Maximum spindle speed in 3 rd gear Setting range: 1 – 9999 [rpm]
P556	GR3MIN
	GR3MIN Minimum spindle speed in 3 rd gear Setting range: 1 – 9999 [rpm]
P557	CRCDL
	CRCDL Minimum allowed movement of tool when motion is on the outter side of sharp angle, near to 90 degree when radius compensation is turned on. Setting range: 0 – 16383 [0.001 mm] 0 – 16383 [0.0001 inch]
P558	GR4MAX
	GR4MAX Maximum spindle speed in 4 th gear Диапазон: 1 – 9999 [rpm] This parameter is enabled by setup options
P558	GR4MIN
	GR4MIN Minimum spindle speed in 4 th gear Диапазон: 1 – 9999 [rpm] This parameter is enabled by setup options
P565	JOGF
	JOGF Feed speed in JOG mode when correction of feed is type B Диапазон: 1 – 2000 [mm/min] 1 – 800 [0.1 inch/min]
P566	JOGFAD
	JOGFAD Feed speed in JOG mode for rotational axis when correction of feed is type B Диапазон: 1 – 2000 [deg/min]
P567	FEDMAD
	FEDMAD Maximum feed when correction of feed is type B (when block contains additional axis) Диапазон: 6 – 15000 [mm/min] 6 – 600 [0.1 inch/min] 6 – 15000 [deg/min]
P568	RPDFLAD
	RPDFLAD Rapid traverse speed, greater than F0 for rotational axis when correction of feed is type B Диапазон: 6 – 15000 [deg/min]
P569	ZRNFLAD
	ZRNFLAD Low speed when searching zero point for rotational axis when correction of motion is type B Диапазон: 6 – 15000 [deg/min]
P570	SPIDS
	SPIDS Spindle indexing speed Диапазон: 0 – 4095 [0.5461 rpm]
P571	SPIDX0
	SPIDX0 Spindle indexing angle Диапазон: 0 – 4095 [11.3778 degree]

9. PARAMETERS

9.2. Description parameters system M (cont.)

Parameter No	
P572	SLPGM
	SLPGM Spindle loop gain when indexing common value $SLPGM = 2048 \cdot (E/L) \cdot a \cdot 1000$ E – taho when spindle motor speed is 1000 rpm L – Angle of rotation of spindle nose for one round of spindle motor A – minimal feedback increment [degree]
P573	SLPGIN
	SLPGIN Spindle loop gain when indexing Setting range: 0 – 9999 [1 / sec]
P574	SPDINP
	SPDINP Inposition to complete indexing (in pulses from encoder)
P575	SPDEV
	SPDEV Minimal dynamic variation of spindle speed to start indexing (pulses from encoder)
P577	SPDLC
	SPDLC Correction of spindle zero speed (offset) Setting range: -81910 – +8192
P578	SPIDX1
	SPIDX1 Second indexing angle for spindle orientation. Active, when signal SNDX1 = '1' (DGN126.3) Setting range: 0 – 4095 [11.3778 degree]
P580	INPX
P581	INPY
P582	INPZ
P583	INP4
P584	INP5
P585	INP6
	INPX – INP6 Maximum static error in position for each axis (X, Y, Z, 4, 5 and 6) Setting range: 0 – 32767 [imp] Standard setting: 20 (metric system); 12 (inch system)
P588	SERRX
P589	SERRY
P590	SERRZ
P591	SERR4
P592	SERR5
P593	SERR6
	SERRX – SERR6 Maximum deviation in position when axis is in motion (for each axis: X, Y, Z, 4, 5 and 6) Setting range: 0 – 32767 [imp] $SERRn = (Fmax/G) \cdot 1.5$ Fmax – maximum speed [imp/sec] G – 30 [1 / sec]
P596	STPEX
P597	STPEY
P598	STPEZ
P599	STPE4
P600	STPE5
P601	STPE6
	STPEX – STPE6 Maximum deviation in position when axis stops (for each axis: X, Y, Z, 4, 5 and 6) Setting range: 0 – 32767 [imp]
P604	GRDSX
P605	GRDSY
P606	GRDSZ
P607	GRDS4
P608	GRDS5
P609	GRDS6
	GRDSX – GRDS4 Shift of zero point for each axis (X, Y, Z, 4, 5 and 6) Setting range: -327670 – +32767 [imp]

9. PARAMETERS

9.2. Description parameters system M (cont.)

Parameter No	
P612	LPGMX
P613	LPGMY
P614	LPGMZ
P615	LPGM4
P616	LPGM5
P617	LPGM6

LPGMX – LPGM6 Loop gain for each axis
 $LPGMn = 20048 * (E / L) * a * 10000 - 32767$ [imp]
 E – taho when motor speed is 1000 rpm
 L – Motion per revolution of motor [mm or inch]
 a – Minimum increment of feed back [mm or inch]

Typical values for LPGMn		
Motion per revolution	Servomotor 7V/1000 rmp	Servomotor 7V/2000 rmp
10 mm	1434	717
8 mm	1792	896
6 mm	2389	1195
5 mm	2867	1434
4 mm	3584	1792
3 mm	4779	2389
2 mm	7168	3584
1 mm	7168	3584
0.5 inch	2867	1434
0.4 inch	3584	1792
0.3 inch	4779	2389
0.25 inch	2867	1434
0.2 inch	7168	2389
0.15 inch	4779	3584
0.1 inch	7168	3584

P620	LINTX
P621	LINTY
P622	LINTZ
P623	LINT4
P624	LINT5
P625	LINT6

LINTX – LINT6 Ramp time when rapid traverse for each axis (X, Y, Z, 4, 5 and 6)
 Setting range: 8 – 4000 [msec]

P628	RPDFX
P629	RPDFY
P630	RPDFZ
P631	RPDF4
P632	RPDF5
P633	RPDF6

RPDFX – RPDF6 Rapid traverse speed for each axis (X, Y, Z, 4, 5 and 6)
 Setting range: 30 – 64000 [mm/min]
 30 – 25000 [inch/min]

P636	RPDJX
P637	RPDJY
P638	RPDJZ
P639	RPDJ4
P640	RPDJ5
P641	RPDJ6

RPDJX – RPDJ6 Rapid traverse speed in JOG mode for each axis (X, Y, Z, 4, 5 and 6)
 Setting range: 30 – 64000 [mm/min]
 30 – 25000 [inch/min]
 If these parameters are '0', then parameters P628 – P635 are used

9. PARAMETERS

9.2. Description parameters system M (cont.)

Parameter No	
P644	BKLX
P645	BKLY
P646	BKLZ
P647	BKL4
P648	BKL5
P649	BKL6
	BKLX – BKL6 Backlash for each axis (X, Y, Z, 4, 5, 6) Setting range: 0 – 255 [0.001 mm] 0 – 255 [0.0001 inch]
P652	DRFTX
P653	DRFTY
P654	DRFTZ
P655	DRFT4
P656	DRFT5
P657	DRFT6
	DRFTX – DRFT4 Drift compensation for each axis (X, Y, Z, 4, 5, 6) Setting range: -1023 – +1023 [mV]
P700	CMOFSX
P701	CMOFSY
P702	CMOFSZ
P703	CMOFS4
P704	CMOFS5
P705	CMOFS6
	CMOFSX – CMOFS6 : Coordinates work offset for each axis (X, Y, Z, 4, 5, 6) These parameters sets offset for work coordinate systems (G54 – G59). Setting range: -7999 – +7999 [0.001 mm] -7999 – +7999 [0.0001 inch]
P708	WKOFS1X
P709	WKOFS1Y
P710	WKOFS1Z
P711	WKOFS14
P712	WKOFS15
P713	WKOFS16
	WKOFS1X – WKOFS16 : 1 st coordinate system (G54) for each axis (X, Y, Z, 4, 5, 6) Setting range: -9999999 – +9999999 [0.001 mm] -9999999 – +9999999 [0.0001 inch] -9999999 – +9999999 [0.001 deg]
P716	WKOFS2X
P717	WKOFS2Y
P718	WKOFS2Z
P719	WKOFS24
P720	WKOFS25
P721	WKOFS26
	WKOFS2X – WKOFS26 : 2 nd coordinate system (G55) for each axis (X, Y, Z, 4, 5, 6) Setting range: -9999999 – +9999999 [0.001 mm] -9999999 – +9999999 [0.0001 inch] -9999999 – +9999999 [0.001 deg]

9. PARAMETERS

9.2. Description parameters system M (cont.)

Parameter No	
P724	WKOFS3X
P725	WKOFS3Y
P726	WKOFS3Z
P727	WKOFS34
P728	WKOFS35
P729	WKOFS36
WKOFS3X – WKOFS36 : 3 rd coordinate system (G56) for each axis (X, Y, Z, 4, 5, 6)	
Setting range: -9999999 – +9999999 [0.001 mm] -9999999 – +9999999 [0.0001 inch] -9999999 – +9999999 [0.001 deg]	
P732	WKOFS4X
P733	WKOFS4Y
P734	WKOFS4Z
P735	WKOFS44
P736	WKOFS45
P737	WKOFS46
WKOFS4X – WKOFS46 : 4 th coordinate system (G57) for each axis (X, Y, Z, 4, 5, 6)	
Setting range: -9999999 – +9999999 [0.001 mm] -9999999 – +9999999 [0.0001 inch] -9999999 – +9999999 [0.001 deg]	
P740	WKOFS5X
P741	WKOFS5Y
P742	WKOFS5Z
P743	WKOFS54
P744	WKOFS55
P745	WKOFS56
WKOFS5X – WKOFS56 : 5 th coordinate system (G58) for each axis (X, Y, Z, 4, 5, 6)	
Setting range: -9999999 – +9999999 [0.001 mm] -9999999 – +9999999 [0.0001 inch] -9999999 – +9999999 [0.001 deg]	
P748	WKOFS6X
P749	WKOFS6Y
P750	WKOFS6Z
P751	WKOFS64
P752	WKOFS65
P753	WKOFS66
WKOFS6X – WKOFS66 : 6 th coordinate system (G59) for each axis (X, Y, Z, 4, 5, 6)	
Setting range: -9999999 – +9999999 [0.001 mm] -9999999 – +9999999 [0.0001 inch] -9999999 – +9999999 [0.001 deg]	
P756	PRSX
P757	PRSY
P758	PRSZ
P759	PRS4
P760	PRS5
P761	PRS6
PRSX – PRS6 : Coordinates for each axis (X, Y, Z, 4, 5, 6) when zero return was performed	
Setting range: -9999999 – +9999999 [0.001 mm] -9999999 – +9999999 [0.0001 inch] -9999999 – +9999999 [0.001 deg]	

9. PARAMETERS

9.2. Description parameters system M (cont.)

Parameter No	
P764	PECINTX
P765	PECINTY
P766	PECINTZ
P767	PECINT4
P768	PECINT5
P769	PECINT6
	PECINTX – PECINT6 : pitch error compensation interval for each axis (X, Y, Z, 4, 5, 6) Setting range: 8000 – +9999999 [0.001 mm] 4000 – +9999999 [0.0001 inch] If '0', compensation is not used
P772	REF2X
P773	REF2Y
P774	REF2Z
P775	REF24
P776	REF25
P777	REF26
	REF2X – REF26 : distance from reference point to the second reference point for each axis (X, Y, Z, 4, 5, 6) Setting range: -9999999 – +9999999 [0.001 mm] -9999999 – +9999999 [0.0001 inch] -9999999 – +9999999 [0.001 deg]
P780	LT1MAXX
P781	LT1MAXY
P782	LT1MAXZ
P783	LT1MAX4
P784	LT1MAX5
P785	LT1MAX6
	LT1MAXX – LT1MAX6 : Maximum axis traverse limit for each axis (X, Y, Z, 4, 5, 6) Setting range: -9999999 – +9999999 [0.001 mm] -9999999 – +9999999 [0.0001 inch] -9999999 – +9999999 [0.001 deg] These parameters specify the region of allowed machine movement. Moving the machine beyond it will cause an overtravel alarm. For each axis set the distance from reference point to the limits
P788	LT1MINX
P789	LT1MINY
P790	LT1MINZ
P791	LT1MIN4
P792	LT1MIN5
P793	LT1MIN6
	LT1MINX – LT1MIN6 : Minimum axis traverse limit for each axis (X, Y, Z, 4, 5, 6) Setting range: -9999999 – +9999999 [0.001 mm] -9999999 – +9999999 [0.0001 inch] -9999999 – +9999999 [0.001 deg] These parameters specify the region of allowed machine movement. Moving the machine beyond it will cause an overtravel alarm. For each axis set the distance from reference point to the limits
P796	REF3X
P797	REF3Y
P798	REF3Z
P799	REF34
P800	REF35
P801	REF36
	REF3X – REF36 : distance from reference point to the third reference point for each axis (X, Y, Z, 4, 5, 6) Setting range: -9999999 – +9999999 [0.001 mm] -9999999 – +9999999 [0.0001 inch] -9999999 – +9999999 [0.001 deg]

9. PARAMETERS

9.2. Description parameters system M (cont.)

Parameter No	
P804	REF4X
P805	REF4Y
P806	REF4Z
P807	REF44
P808	REF45
P809	REF46
	REF4X – REF46 : distance from reference point to the fourth reference point for each axis (X, Y, Z, 4, 5, 6) Setting range: -9999999 – +9999999 [0.001 mm] -9999999 – +9999999 [0.0001 inch] -9999999 – +9999999 [0.001 deg]
P812	WKOF57X
P813	WKOF57Y
P814	WKOF57Z
P815	WKOF574
P816	WKOF575
P817	WKOF576
	WKOF57X – WKOF576 : 7 th work coordinate system (G77) for each axis (X, Y, Z, 4, 5, 6) Set the 7 th work zero-point offset amount Setting range: -9999999 – +9999999 [0.001 mm] -9999999 – +9999999 [0.0001 inch] -9999999 – +9999999 [0.001 deg]
P820	WKOF58X
P821	WKOF58Y
P822	WKOF58Z
P823	WKOF584
P824	WKOF585
P825	WKOF586
	WKOF58X – WKOF586 : 8 th work coordinate system (G78) for each axis (X, Y, Z, 4, 5, 6) Set the 8 th work zero-point offset amount Setting range: -9999999 – +9999999 [0.001 mm] -9999999 – +9999999 [0.0001 inch] -9999999 – +9999999 [0.001 deg]
P828	WKOF59X
P829	WKOF59Y
P830	WKOF59Z
P831	WKOF594
P832	WKOF595
P833	WKOF596
	WKOF59X – WKOF596 : 9 th work coordinate system (G79) for each axis (X, Y, Z, 4, 5, 6) Set the 9 th work zero-point offset amount Setting range: -9999999 – +9999999 [0.001 mm] -9999999 – +9999999 [0.0001 inch] -9999999 – +9999999 [0.001 deg]
P840	DGNBYTE
	DGNBYTE set the number of bytes displayed from DGN 300 in decimal format
P841	DGNWORD
	DGNWORD set the number of words displayed in decimal at DGN area after area, specified by parameter 840
P842	DGNTIMER
	DGNTIMER set the number of timers displayed in decimal at DGN area after area, specified by parameter 841
P843	DGNCOUNTER
	DGNCOUNTER set the number of counters displayed in decimal at DGN area after area, specified by parameter 842

9. PARAMETERS

9.2. Description parameters system M (cont.)

Parameter No	
P1000 – P1127	PECX000 – PECX127 PECX000 – PECX127 : pitch error compensation interval for axis X Setting range: -7 – +7
P2000 – P2127	PECY000 – PECY127 PECY000 – PECY127 : pitch error compensation interval for axis Y Setting range: -7 – +7
P3000 – P3127	PECZ000 – PECZ127 PECZ000 – PECZ127 : pitch error compensation interval for axis Z Setting range: -7 – +7
P4000 – P4127	PEC4000 – PEC4127 PEC4000 – PEC4127 : pitch error compensation interval for axis 4 Setting range: -7 – +7
P5000 – P5127	PEC5000 – PEC5127 PEC5000 – PEC5127 : pitch error compensation interval for axis 5 Setting range: -7 – +7
P6000 – P6127	PEC6000 – PEC6127 PEC6000 – PEC6127 : pitch error compensation interval for axis X 6 Setting range: -7 – +7

Note: Parameters not specified in this manual must be not used and set to '0'.

10. SYSTEM ALARMS

10.1. Alarms system M

Alarm No	Description
003	Data exceeding the maximum allowable number of digits.
004	A digit, or sign '-' was input without address at the beginning of a block. Change the program.
005	The address was not followed by the appropriate data, but another address or EOB. Change the program.
006	Error in sign: '-' was input after an address, which cannot be negative.
007	Decimal point '.' was input after address, which can't use it.
009	Unusable character was input.
010	Unusable G code was commanded.
011	Feed rate is not specified in cutting block.
014	A synchronous feed is specified without the option of threading.
015	The number of commanded axis in a block exceed the number of controlled axis.
021	An axis is not in the plane (selected by G17, G18 or G19) when circular interpolation was commanded.
023	In circular interpolation a negative value was commanded for address R.
025	Feed rate was set to F0 in circular interpolation. Change the program.
029	The offset value specified by H code is too large. Change the program.
030	The offset number specified by H code is too large. Change the program.
031	When G10 was commanded, the offset number following address P was excessive or is not specified.
032	In setting an offset amount by G10, the offset amount was excessive.
033	Intersection point cannot be determinated for cutter compensation type C.
034	The start up or cancel was going to be performed in circular interpolation mode in cutter compensation type C.
035	G39 is commanded in cutter compensation type B cancel mode, or in the different plane.
036	Skip cutting (G31) was specified in cutter compensation mode.
037	G40 is commanded at the plane other than compensation plane in cutter compensation type B. Or plane, selected by G17, G18 or G19 was changed in cutter compensation type C mode.
038	Overcutting will occur in cutter compensation mode C, because the start or end point of the arc coincides with the arc center.
041	Overcutting will occur in cutter compensation mode type C.
044	One of codes G27 or G30 is commanded in canned cycle mode.
059	The program with the selected number cannot be found.
070	The program memory is full.
071	The address or the program cannot be found.
072	The number of stored programs exceeds 512.
073	The specified program number was already used.
074	The program number is not in the range 1 - 9999.
076	Address P was not commanded in the block, that contains G65 or M98.
077	The subprogram was called in three folds.
078	A program number, specified by address P in the block, which includes M98, M99, G65 or G66 was not found.
090	The reference point return cannot be completed normally, because the reference impulse is too close to DEC signal, or speed is too slow.
100	PRM MODIFY was set to '1'. Turn it to '0' and restart the system.
111	The result of calculation in macro instruction exceeds the allowed range ($-2^{32} + 2^{32}$).
112	Division by zero or tan(90) was specified.
114	Undefined H code was used in G65 block.
115	Undefined number of variable.
116	The variable number specified by P is forbidden for assignment.

10. SYSTEM ALARMS

10.1. Alarms system M (cont.)

Alarm No	Description
119	The argument of SQRT or BCD is negative.
122	Modal macro is called twice.
125	An unusable address is used in G65 block.
128	Sequence number exceeded range 0-9999 or cannot be found.
200	Serial communication was terminated by the user.
201	Serial communication was terminated by remote host.
202	Communication device can't find file.
203	Communication device can't write data.
204	The file transfer was not completed.
205	Error in serial data.
250	Machine panel is disconnected.
251	I/O module No1 is disconnected.
252	I/O module No2 is disconnected.
253	I/O module No3 is disconnected.
300	PMC-X is enabled, but not found.
301	Parameter is changed and system needs restart.
302	Program memory is corrupted. Erase memory and reload parameters, offsets, and programs.
400	Overload from servodrive is OFF.
401	VRDY from servodrive is OFF.
402	VRDY is ON, before PRDY from CNC.
403	System error in positioning (encoder, CNC or servo). Try again after manual return to reference point.
4n0	Position deviation for axis number 'n' when axis is stopping is greater than specified in parameter.
4n1	Position deviation for axis number 'n' when axis is in motion is greater than specified in parameter.
4n2	Commanded speed for axis number 'n' is greater than 1000000 units/second. Probably bad CMR is set.
4n3	Disconnect of encoder for axis number 'n'.
4n4	Drift for axis number 'n' is greater than 500 units.
4n5	Position deviation for axis number 'n' when axis is stopped is greater than specified in parameter.
6n0	Software position limit for axis number 'n' is reached in '+' direction.
6n1	Software position limit for axis number 'n' is reached in '-' direction.
500-599	Error when executing custom macro program.
600	CNC is overheated.
601	Servomotor is overheated.

10. SYSTEM ALARMS

10.2. Alarms system T

Alarm No	Description
003	Data exceeding the maximum allowable number of digits.
005	The address was not followed by the appropriate data, but another address or EOB. Change the program.
006	Error in sign: '-' was input after an address, which cannot be negative.
007	Decimal point '.' was input after address, which can't use it.
009	Unusable character was input.
010	Unusable G code was commanded.
011	Feed rate is not specified in cutting block.
029	The offset value specified by T code is too large.
030	The offset number specified by H code is too large.
031	When G10 was commanded, the offset number following address P was excessive or is not specified.
032	In setting an offset amount by G10, the offset amount was excessive.
033	Intersection point cannot be determined for tool nose radius compensation.
034	The start up or cancel was going to be performed in circular interpolation mode in tool nose radius compensation.
035	Skip cutting (G31) was specified in tool nose radius compensation mode.
038	Overcutting will occur in tool nose radius compensation mode, because the start or end point of the arc coincides with the arc center.
039	Chamfering or corner R was specified with a start-up, a cancel, or switching between G41 and G42 in tool nose radius compensation.
040	Overcutting will occur in tool nose radius compensation in canned cycles G90 or G94.
041	Overcutting will occur in tool nose radius compensation.
050	Chamfering or corner R are commanded in thread cutting block.
051	Improper movement of the block next to that for which chamfering and corner R are commanded.
052	The block next to the block for which chamfering and corner R are commanded is not G01.
054	A block in which the chamfering and corner R are commanded includes a taper command.
055	In the block for which the chamfering and corner R are commanded, the move distance is less than the corner R amount.
059	The program with the selected number cannot be found.
060	The specified line number cannot be found.
061	Address P or Q was not commanded in some of canned cycles G70, G71, G72 or G73.
062	* The depth of cut in G71 or G72 is zero or negative * The repetitive count in G73 is zero or negative value. * The negative value is specified to Δi or Δk in G74 or G75. * A nonzero value is specified to address U or W, when Δi or Δk is zero in G74 or G75. * A negative value is specified to Δd in G74 or G75. * Zero or negative value is specified to the height of thread or depth of cut of 1st time in G76. * The specified minimum depth of cut in G76 is greater than the height of thread. * An unusable angle of tool tip is specified in G76.
063	Number specified by address P in G70, G71, G72 or G73 cannot be found.
065	* G00 or G01 is not commanded at the block with the sequence number, specified by P in cycles G71, G72 or G73. * Address Z(W) or X (U) was commanded in the block with a sequence number specified by address P in G71 or G72.
066	An G code, which is not allowed was commanded between two blocks specified by address P and Q in G71, G72 or G73.
067	G70, G71, G72 or G73 command with address P and Q was specified in MDI mode.
069	The final move command in the block specified by P and Q of G70, G71, G72 or G73 ended with chamfering or corner R.
070	The program memory is full.
071	The address or the program cannot be found.
072	The number of stored programs exceeds 512.

10. SYSTEM ALARMS

10.2. Alarms system T (cont.)

Аларма No	Описание
073	The specified program number was already used.
074	The program number is not in the range 1 – 9999.
076	Address P was not commanded in the block, that contains G65 or M98.
077	The subprogram was called in three folds.
078	A program number, specified by address P in the block, which includes M98, M99, G65 or G66 was not found.
080	When the axis reached the area, specified by parameters, PMC signals XAE and ZAE were not output from the machine tool (automatic tool compensation function).
081	Automatic tool compensation was specified without T code.
082	В един и същи блок блок са зададени Т код и автоматична компенсация на инструмента.
083	In automatic tool compensation, an invalid axis was specified or the command is incremental.
090	The reference point return cannot be completed normally, because the reference impulse is too close to DEC signal, or speed is too slow.
092	The commanded axis by G27 did not return to reference point.
100	PRM MODIFY was set to '1'. Turn it to '0' and restart the system.
111	The result of calculation in macro instruction exceeds the allowed range ($-2^{32} + 2^{32}$).
112	Division by zero or $\tan(90)$ was specified.
114	Undefined H code was used in G65 block.
115	Undefined number of variable.
116	The variable number specified by P is forbidden for assignment.
119	The argument of SQRT or BCD is negative.
125	An unusable address is used in G65 block.
128	Sequence number exceeded range 0-9999 or cannot be found.
200	Serial communication was terminated by the user.
201	Serial communication was terminated by remote host.
202	Communication device can't find file.
203	Communication device can't write data.
204	The file transfer was not completed.
205	Error in serial data.
250	Machine panel is disconnected.
251	I/O module No1 is disconnected.
252	I/O module No2 is disconnected.
253	I/O module No3 is disconnected.
300	PMC-X is enabled, but not found.
301	Parameter is changed and system needs restart.
302	Program memory is corrupted. Erase memory and reload parameters, offsets, and programs.
400	Overload from servodrive is OFF.
401	VRDY from servodrive is OFF.
402	VRDY is ON, before PRDY from CNC.
405	System error in positioning (encoder, CNC or servo). Try again after manual return to reference point.
4n0	Position deviation for axis number 'n' when axis is stopping is greater than specified in parameter.
4n1	Position deviation for axis number 'n' when axis is in motion is greater than specified in parameter.
4n2	Commanded speed for axis number 'n' is greater than 1000000 units/second. Probably bad CMR is set.
4n3	Disconnect of encoder for axis number 'n'.
4n4	Drift for axis number 'n' is greater than 500 units.
4n5	Position deviation for axis number 'n' when axis is stopped is greater than specified in parameter.

10. SYSTEM ALARMS

10.2. Alarms system T (cont.)

Alarm No	Description
6n0	Software position limit for axis number 'n' is reached in '+' direction.
6n1	Software position limit for axis number 'n' is reached in '-' direction.
	*Note: This check can be ignored, if when CNC is turned ON both buttons [CAN] and [P] are pressed.
600	CNC is overheated.
601	Servomotor is overheated.

11. OPTION SETTINGS

11.1. PCB options for system M and T

	7	6	5	4	3	2	1	0
0	AFLSH		ENCN3	ENCN2	MPG2	MPG1	MPG0	KBDE
1					USB	IPRDY	DMPG1	DMPG0
2	DVRD7	DVRDY6	DVRDY5	DVRDY4	DVRDY3	DVRDY2	DVRDY1	DVRDY0
3	DOVL7	DOVL6	DOVL5	DOVL4	DOVL3	DOVL2	DOVL1	DOVL0
4	DOH7	DOH6	DOH5	DOH4	DOH3	DOH2	DOH1	DOH0
5	DDAL7	DDAL6	DDAL5	DDAL4	DDAL3	DDAL2	DDAL1	DDAL0
6	INVC7	INVC6	INVC5	INVC4	INVC3	INVC2	INVC1	INVC0
7	DIRA7	DIRA6	DIRA5	DIRA4	DIRA3	DIRA2	DIRA1	DIRA0
8	CMD7	CMD6	CMD5	CMD4	CMD3	CMD2	CMD1	CMD0
9								
10	TAH07	TAH06	TAH05	TAH04	TAH03	TAH02	TAH01	TAH00
11	TAH17	TAH16	TAH15	TAH14	TAH13	TAH12	TAH11	TAH10
12	TAH27	TAH26	TAH25	TAH24	TAH23	TAH22	TAH21	TAH20
13	HIS7	HIS6	HIS5	HIS4	HIS3	HIS2	HIS1	HIS0
14								
15								
16								
17								
18								
19								

KBDE - 0 : normal keyboard (for MDI with 8.4" TFT)

1 : wide keyboard (for MDI with 15" TFT)

MPGC2..0 – number of connected MPGs

000 – no MPG, so STEP mode is switched

001 - 1

010 - 2

011 - 3

100 - 4

DDALx - Disable "DISCONNECT" alarm from encoder for each axis - 0, 1, 2, 3, 4, 5, 6, 7

1: disabled

0: enabled

DVRyX - Disable "VRDY OFF" alarm for each axis - 0, 1, 2, 3, 4, 5, 6, 7

1: disabled

0: enabled

DOVLx - Disable "SERVO OVERLOAD" alarm for each axis - 0, 1, 2, 3, 4, 5, 6, 7

1: disabled

0: enabled

DOHx - Disable "OVERHEAT" alarm for each axis - 0, 1, 2, 3, 4, 5, 6, 7

1: disabled

0: enabled

11. OPTION SETTINGS

11.1. PCB options for system M or T (cont.)

AFLSH - enables FLASH library (62MB)

DMPGx - change counting direction for corresponding MPG

IPRDY - inverts logic for signal PRDY
0: system is ready, when PRDY = '1'
1: system is ready, when PRDY = '0'

USBD - enables USB flash drive (if it was installed)

ENCN2 - 1: enables communication by channel CN2-2 (second I/O module)
0: disables communication by channel CN2-2

ENCN3 - 1: enables communication by channel CN3 (third I/O module)
0: disables communication by channel CN3

DIRAx - inverts direction of feedback (changes pulses from encoder) for each axis

CMDx - inverts command to servodrive for each axis

INVCx - inverts index signal from encoder (C signal) for each axis

TAH0x TAH1x - gain of taho for each type of encoder

0	0	- encoder 2500 ppr
0	1	- encoder 2000 ppr
1	0	- encoder 1500 ppr
1	1	- encoder 1000 ppr

Level of taho is 3V when 1000 rpm.

TAH2x - reserved

HISx - 0: interpolation time is 8 ms (command is updated every 250 μ s)
1: interpolation time is 4 ms (command is updated every 125 μ s)

For standard software, this bits MUST be '1'!

11. OPTION SETTINGS

11.2. SETUP options for system T

	7	6	5	4	3	2	1	0
0	PMCX	BCODE		SANLG		FLUP		3AXLS
1			CHMFR	TOOLP	CORNA			
2	TLIFE				WSHFT	MIX		
3	GSPEC	G3637	G34		G8889	G2223	EXTS	G6869
4					ZRN4	ZRN3	ZRNZ	ZRNX
5					MSR4	MSR3	MSRZ	MSRX
6								
7								
8								
9	OCMR	O9000						SIM
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								

3AXLS – enables third axis (X, Z, C, S)

FLUP - enables following mode (SVFx signals)

SANLG – analog spindle command (или 12-bit R код)

BCODE – enables usage of B-code

PMCX - enables controller PMC-X

CHMFR – enables chamfering and corners

TOOLP – enables tool position to be checked from PMC-X

CORNA – enables angle programming

TLIFE - enables "TOOL LIFE"

WSHFT - enables "WORK SHIFT"

11. OPTION SETTINGS

11.2. SETUP options system T (cont.)

MIX - enables mirror draw of X axis

GSPEC – enables special G codes

G3637 - enables G36 and G37

G34 - enables G34

G8889 - enables G88 and G89

G2223 - enables G22 and G23

EXTS - enables external program searching

G6869 - enables G68 and G69

MSRX..MSR4 - 0- normal reference point return
1- reference point is reached by magnet switch method

ZRNX..ZRN4 - 0- searching of reference point is in direction (+)
1- searching of reference point is in direction (-)

SIM – simulates machine inputs from screen “I/O SIMULATOR”

WARNING: this mode must be used ONLY for testing! Real inputs and outputs are NOT USED!

OCMR – enables optional CMR
P500-P507 - multiplier CMRx
P508-P515 - divisor CMRx

O9000 – disables editing of programs with number greater than 9000

11. OPTIONS SETTINGS

11.2. SETUP options for system M

	7	6	5	4	3	2	1	0
0	PMCX	BCODE	PEC	SANLG	SIMAX	FLUP	ADXS1	ADXS0
1	CRCC	CRCB		SYNFD	HELIC	M06	M60	JOGVR
2								
3	MSR8	MSR7	MSR6	MSR5	MSR4	MSRZ	MSRY	MSRX
4	ZRN8	ZRN7	ZRN6	ZRN5	ZRN4	ZRNZ	ZRNY	ZRNX
5	NAM53	NAM52	NAM51	NAM50	NAM43	NAM42	NAM41	NAM40
6	NAM73	NAM72	NAM71	NAM70	NAM63	NAM62	NAM61	NAM60
7	ADDM				NAM83	NAM82	NAM81	NAM80
8	ROT8	ROT7	ROT6	ROT5	ROT4			
9	OCMR	O9000	GR4		LASER			SIM
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								

ADXS1:ADXS0 – sets number of axis

00: 3

01: 4

10: 5

11: 6

FLUP - enables following mode (SVF_x signals)

SIMAX – simultaneous interpolation of all axis

SANLG – analog command for spindle (or 12-bit R code)

PEC - enables “pitch error” compenastion

BCODE – enables usage of B-code

PMCX - enables PMC-X

JOGVR – enables feed override in JOG mode from signals at DGN104

M06 - enables M06 to call subprogram O9001. M06 is not buffered

M60 - enables M60 to call subprogram O9002. M60 is not buffered

HELIC – enables helical interpolation

SYNFD – enable synchronous feed (spindle encoder must be 1024 ppr)

CRCC:CRCB - tool radius compensation type

00: disabled

01: CRC-B

11: CRC-C (default)

11. OPTIONS SETTINGS

11.2. SETUP options for system M (cont.)

MSRX..MSR8 - 0- normal reference point return

1- reference return is performed by magnet switch method

ZRX..ZRN8 - 0- searching of reference point is in direction (+)

1- searching of reference point is in direction (-)

NAMx3..NAMx0 – sets the name of corresponding axis

0000: A

0001: B (this disables usage of B-code)

0010: C

0011: U

0100: V

0101: W

0110: A

0111: A

If the name is already in use, next letter is used

ADDM - enables usage of letters "A" "B" and "C" in macro programming (if letters are not used as axis names)

ROT8..ROT4 – axis is

0: linear

1: rotary

SIM – simulates machine inputs from screen "I/O SIMULATOR"

WARNING: This mode must be used ONLY for testing! Real inputs and outputs ARE NOT USED!

O9000 – disables editing of program with number greater than 9000

GR4 – enables usage of 4th spindle gear

LASER – enables software for laser machines

P529 – time constant for G02/G03 (usually 10ms)

P528 – time constant for G01 (usually 10-50ms)

To change some of these bits:

1. Turn system OFF.
2. Press and hold [ALTER] key and turn system ON.
3. Enter the code 4562951413 and press [INPUT].
4. Select menu "System Utilities".
5. Choose menu "Setup Options" or "PCB Options".
6. Change the values.
7. Press [INSERT] to save changes.

Code for end users is 6362666.

ALL PARAMETERS, NOT SPECIFIED HERE MUST BE SET TO '0'!