SOFTWARE

KR C...

System Variables

KUKA System Software (KSS)

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Contents

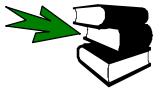
1 How to use this documentation

This tabular summary of the system variables is intended to serve as an aid for programmers with good knowledge of the functions of the KUKA robot system and the KR C... controller, and who are thoroughly familiar with programming.

Many variable values are preset by the manufacturer (default values) and should not be changed without a compelling reason. If changes are nevertheless necessary, they can be carried out using the variable modification function or by editing the files.

Change the values of variables only if you have sufficient knowledge of the functions of the system variables and their effects!

The manufacturer accepts no liability and provides no warranty whatsoever for damage of any kind arising from improper modification of variable values or their modification for a purpose other than the intended one.



Please also observe the chapter [Safety] in the handbook.

Please note:

Each table is preceded by a title with the name and function of the system variable, e.g.:

Variable name **Function of the variable**

Data type		Value	min.	
Unit			max.	
In file				
Original line				
Comments				

Options	Effect

If no **Options** are specified, then the second table is omitted.

Table entries:

Data type	Real, Integer, Boolean, Character, Structure, Signal declaration, Enum, Frame, Array

Unit	ms, mm, m/s^2, s, °, %, V, A, increments, bits, bit sequence, motion instructions

In file	KRC\Roboter\KRC\R1\Mada\... ... \Steu\Mada\...

Original line	Source text ;Comment

Comments	Functional description

Value	min. max.	Minimum and maximum values depending on the specific data type

Option	Options depending on the data type (TRUE, FALSE, 1, 2, etc.)

A **group** of system variables is indicated at the beginning with a framed name box:

Variable name **Function of the variable**

Data type	Structure	Value min.	
Unit		Value max.	
In file			
Original line			
Comments			

If the description contents of subsequent system variables remain the same, only their title lines are displayed.

Variable name.1 **Function of the variable**

If there is a change, the corresponding section of the table is shown under the title line. This change then applies to all subsequent variables of the group.

Variable name.2 **Function of the variable**

Data type	Real	Value min.	0
Unit	mm, °	Value max.	

Variable name.3 **Function of the variable**

2 A

$A4PAR

Set axis 4 parallel to the last rotational main axis

Data type	Integer	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	INT $A4PAR		
Comments			

Options	Effect
0	Not set
1	Set

$ABS_ACCUR

Switch absolutely accurate robot model on/off

Data type	Boolean	Value min.	
Unit		Value max.	
In file	---		
Original line	BOOL $ABS_ACCUR=FALSE ;Absolutgenaues Robotermodell		
Comments			

Options	Effect
TRUE	Switched on
FALSE	Switched off

$ABS_CONVERT

Conversion of point coordinates into absolutely accurate robot model

Data type	Boolean	Value min.	
Unit		Value max.	
In file	Steu\Mada\$custom.dat		
Original line	BOOL $ABS_CONVERT=FALSE ;Konvertierung der Punktkoordinaten		
Comments			

Options	Effect
TRUE	
FALSE	

$ABS_RELOAD

Reload absolutely accurate robot model

Data type	Boolean	Value min.	
Unit		max.	
In file	Steu\Mada\$operate.dat		
Original line	BOOL $ABS_RELOAD		
Comments			

$ACC

Path, swivel and rotational accelerations in the advance run

Data type	Structure	Value min.	
Unit		max.	
In file	---		
Original line	DECL CP $ACC		
Comments	Accelerations in the advance run CP = m/s^2, ORI1 = °/s^2, ORI2 = °/s^2		

$ACC_ACT_MA

Limit value of axial command acceleration

Data type	Integer	Value min.	
Unit	%	max.	
In file	R1\Mada\$machine.dat		
Original line	INT $ACC_ACT_MA=250 ;Grenzwert Sollbeschleunigung [%]		
Comments			

$ACC_AXIS[n]

Acceleration of the axes in the advance run

Data type	Integer	Value min.	
Unit	%	max.	
In file	---		
Original line	INT $ACC_AXIS[n] Beschleunigung der Achsen [%] Vorlauf		
Comments	[n] = [1] ... [6] axes A1 ... A6		

$ACC_AXIS_C[n]

Acceleration of the axes in the main run

Data type	Integer	Value	min.	
Unit	%		max.	
In file	R1\Mada\$operate.dat			
Original line	INT $ACC_AXIS_C[n] Beschleunigung der Achsen [%] Hauptlauf			
Comments	[n] = [1] ... [6] axes A1 ... A6			

$ACC_C

Path, swivel and rotational accelerations in the main run

Data type	Structure	Value	min.	
Unit			max.	
In file	R1\Mada\$operate.dat			
Original line	DECL CP $ACC_C			
Comments	Accelerations in the main run CP = m/s^2, ORI1 = °/s^2, ORI2 = °/s^2			

$ACC_CAR_ACT

The current values of the acceleration components and the total acceleration

Data type	Frame	Value	min.	
Unit	m/s^2		max.	
In file	R1\Mada\$operate.dat			
Original line	DECL ACC_CAR $ACC_CAR_ACT			
Comments	The X, Y and Z components of “$ACC_CAR_ACT” contain the acceleration components along the axes of “$ACC_CAR_TOOL”. “$ACC_CAR_ACT.ABS” contains the associated total acceleration value. Components A, B and C are each set to “0”. This variable is write-protected. Acceleration due to gravity (9.81 m/s^2) is automatically calculated into the acceleration caused by the motion.			

$ACC_CAR_LIMIT

Used to set the maximum permissible value for the acceleration components and the total acceleration

Data type	Frame	Value	min.	
Unit	m/s^2		max.	
In file	R1\Mada\$machine.dat			
Original line	DECL ACC_CAR $ACC_CAR_LIMIT={X 0.0,Y 0.0,Z 0.0,A 0.0,B 0.0,C 0.0,ABS 0.0}			
Comments	If the variable "$ACC_CAR_STOP" is set to "TRUE", then if the acceleration value is exceeded the robot is stopped (ramp-down braking) and an acknowledgement message is generated. The values can only be modified by editing the machine data.			

$ACC_CAR_MAX

Saves the greatest absolute values of "$ACC_CAR_ACT"

Data type	Frame	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	DECL ACC_CAR $ACC_CAR_MAX			
Comments	This variable can be set to "0" to determine the maximum values.			

$ACC_CAR_STOP

The robot can be stopped if "$ACC_CAR_LIMIT" is exceeded

Data type	Boolean	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	BOOL $ACC_CAR_STOP=FALSE			
Comments	Activates or deactivates the stop reaction when the value specified in "$ACC_CAR_LIMIT" is exceeded. The values can only be modified by editing the machine data.			

Options	Effect
TRUE	Stop reaction is activated.
FALSE	Stop reaction is deactivated.

$ACC_CAR_TOOL

A point on the tool mounted on the robot at which the current effective acceleration is measured

Data type	Frame	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	FRAME $ACC_CAR_TOOL={x 0.0,y 0.0,z 0.0,a 0.0,b 0.0,c 0.0}			
Comments	In the same way as “$TOOL”, $ACC_CAR_TOOL is also specified relative to the flange by means of the X, Y and Z coordinates. The angles of rotation A, B and C indicate the positions of the 3 axes of the coordinate system in which the acceleration components are then specified. The individual acceleration components and the total acceleration are all evaluated cyclically. Acceleration caused by gear unit torsion or flexion of the robot is not taken into consideration. These values can only be modified by editing the machine data.			

$ACC_EXTAX[6]

Acceleration of the external axes in the advance run

Data type	Integer	Value	min.	
Unit	%		max.	
In file	---			
Original line	INT $ACC_EXTAX[6] ;Beschleunigung der externen Achsen [%] Vorlauf			
Comments				

$ACC_EXTAX_C[6]

Acceleration of the external axes in the main run

Data type	Integer	Value	min.	
Unit	%		max.	
In file	---			
Original line	INT $ACC_EXTAX_C[6] ;Beschleunigung der externen Achsen [%] Hauptlauf			
Comments				

$ACC_MA

Maximum values for path acceleration, swivel acceleration and rotational acceleration

Data type	Structure	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	DECL CP $ACC_MA={CP 4.6,ORI1 200.0,ORI2 200.0}			
Comments	CP = Max. path acceleration [m/s^2], ORI1 = Max. swivel acceleration [°/s^2], ORI2 = Max. rotational acceleration [°/s^2] When calculating the values, make sure that no axis goes to current limitation.			

$ACC_OV

Data for acceleration with changes of override

Data type	Structure	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	DECL CP $ACC_MA={CP 4.6,ORI1 200.0,ORI2 200.0}			
Comments	CP = Path acceleration with change of override [m/s^2], ORI1 = Swivel acceleration with change of override [°/s^2], ORI2 = Rotational acceleration with change of override [°/s^2]			

$ACT_BASE

Number of the current BASE system

Data type	Integer	Value	min.	
Unit			max.	
In file	---			
Original line	INT $ACT_BASE ;Aktuelle Base-Nummer			
Comments				

$ACT_EX_AX

Number of the current external base kinematic system

Data type	Integer	Value	min.	
Unit			max.	
In file	---			
Original line	INT $ACT_EX_AX ;Aktuelle externe Kinematik			
Comments				

$ACT_TOOL

Number of the current tool coordinate system

Data type	Integer	Value	min.	
Unit			max.	
In file	---			
Original line	INT $ACT_TOOL ;Aktuelle Toolnummer			
Comments				

$ACT_VAL_DIF

Max. permissible difference of encoder actual values when switching on system

Data type	Integer	Value	min.	
Unit	Increments		max.	
In file	R1\Mada\$machine.dat			
Original line	INT $ACT_VAL_DIF ;Geberistwertdifferenz [Inkr]			
Comments	If the limit values are exceeded, the message “Perform mastering” appears.			

$ADAP_ACC

Activation of acceleration adaptation

Data type	Enum	Value	min.	
Unit			max.	
In file	R1\Mada\$robcor.dat			
Original line	DECL ADAP_ACC $ADAP_ACC=#STEP1 ;Beschleunigungsanpassung (#NONE, #STEP1)			
Comments	*) #STEP1 and #STEP2 require valid dynamic data ($DYN_DAT)			

Options	Effect
#NONE	Not activated
#STEP1	Dynamic model without kinetic energy *)
#STEP2	Dynamic model with kinetic energy *)

$ADVANCE

Specification of the advance run (max. 5 motion blocks)

Data type	Integer	Value	min.	0
Unit	Motion blocks		max.	5
In file	---			
Original line	INT $ADVANCE ;Vorlauf [max. 5 Bewegungssätze]			
Comments				

$ALARM_STOP

Signal declaration for short-circuit braking (dynamic braking)

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	Steu\Mada\$machine.dat			
Original line	SIGNAL $ALARM_STOP $OUT[1013]			
Comments				

$ANA_DEL_FLT

Analog output filter

Data type	Enum	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	DECL SW_ONOFF $ANA_DEL_FLT=#OFF			
Comments				

Options	Effect
#ON	Switched on
#OFF	Switched off

$ANIN[n]

Analog inputs

Data type	Real	Value	min.	-1.0
Unit	V		max.	+1.0
In file	---			
Original line	REAL $ANIN[n]			
Comments	[n] = [1] ... [8] -1.0 --> -10 V +1.0 --> +10 V			

$ANOUT[n] — Analog outputs

Data type	Real	Value	min.	-1.0
Unit	V		max.	+1.0
In file	---			
Original line	REAL $ANOUT[n]			
Comments	[n] = [1] ... [16] -1.0 --> -10 V +1.0 --> +10 V			

$APO_DIS_PTP[n] — Maximum approximation distance for PTP axis[n]

Data type	Real	Value	min.	
Unit	mm, °		max.	
In file	R1\Mada\$machine.dat			
Original line	REAL $APO_DIS_PTP[n]			
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6			

$ASYNC_AX — Motion input for asynchronous external axes E1 - E6, negative or positive direction

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	Steu\Mada\$machine.dat			
Original line				
Comments				

$ASYNC_AX1_M ... $ASYNC_AX6_M — Motion input for asynchronous external axes E1 - E6, negative direction

Original line	SIGNAL $ASYNC_AX1_M $IN[1026] ... SIGNAL $ASYNC_AX6_M $IN[1026]

$ASYNC_AX1_P ... $ASYNC_AX6_P

Motion input for asynchronous external axes E1 - E6, positive direction

Original line	SIGNAL $ASYNC_AX1_P $IN[1026] ... SIGNAL $ASYNC_AX6_P $IN[1026]

$ASYNC_AXIS

Bit arrays to switch external axes to asynchronous mode

Data type	Integer	Value min.	
Unit		Value max.	
In file	---		
Original line	INT $ASYNC_AXIS ;Aktive asynchrone Zusatzachsen		
Comments	When $ASYNC_AXIS is assigned in a KRL program, the newly-defined asynchronous axes are valid from this position until a new assignment is made. When $ASYNC_AXIS is defined, the advance run will be stopped if the value of $ASYNC_AXIS changes. Before a new value of $ASYNC_AXIS is saved, the system will wait until all synchronous motions (through advance run stop) and all asynchronous motions have been completed, and all axes are in position. Thus the instruction "$ASYNC_AXIS=..." can be used – along with the system variable $ASYNC_STATE – to synchronize in time synchronous and asynchronous motions. $ASYNC_AXIS can only be modified in the KRL program, and not in the interrupt or in the SUBMIT interpreter. The bits correspond to the external axes in ascending order: Bit 0 = external axis 1, Bit 1 = external axis 2, etc. If the bit is set, the external axis will be switched to asynchronous mode; if it is reset, the external axis will be switched back to synchronous mode.		

Options	Effect
Bit = 1	The corresponding external axis is switched to asynchronous mode
Bit = 0	The corresponding external axis is switched to synchronous mode

$ASYNC_FLT — Filter for asynchronous external axes

Data type	Integer	Value	min.	0
Unit	ms		max.	16
In file	---			
Original line	INT $ASYNC_FLT			
Comments	The value of $ASYNC_FLT is the filter length in milliseconds for all asynchronously coordinated motions; it corresponds to the system variable $FILTER for synchronous motions.			

$ASYNC_MODE — Mode for asynchronous external axes

Data type	Integer	Value	min.	0
Unit			max.	16
In file	Steu\Mada\$custom.dat			
Original line	INT $ASYNC_MODE='B0000' ;Mode für asynchrone Zusatzachsen			
Comments	In the machine data of the controller, the bit mask $ASYNC_MODE can be used to set various asynchronous motion execution modes. It is not possible to change modes while the robot controller is running. The modes can be combined in any way desired. Certain modes must be set in order to use special applications. In the standard setting (default mode) no $ASYNC_MODE bits are set. Only bit 0 is used at this time: Bit 0 = 0 (1st bit): default mode Bit 0 = 1 (1st bit): mode 1 Bit 1 = (2nd bit): mode 2 block selection response			

$ASYNC_OPT — Option flag for "Asynchronous axes are possible"

Data type	Boolean	Value	min.	
Unit			max.	
In file	Steu\Mada\$option.dat			
Original line	BOOL $ASYNC_OPT=FALSE			
Comments				

Options	Effect
TRUE	Asynchronous axes possible
FALSE	Asynchronous axes not possible

$ASYNC_STATE — Current asynchronous motion execution state

Data type	Enum	Value min.	
Unit		Value max.	
In file	---		
Original line	DECL ASYNC_STATE $ASYNC_STATE ;Zustand der asynchronen Achsen		
Comments	$ASYNC_STATE can be used to check the current asynchronous motion execution state. The value is read-only; no assignments are possible. Asynchronous and “normal” robot motions can be synchronized using this variable.		

Options	Effect
#BUSY	Asynchronous motions active, stopped or temporarily stored.
#IDLE	No asynchronous motions active or stopped (queue is empty); last motion terminated without an interrupt.
#CANCELLED	No asynchronous motions active or stopped (queue is empty); last motion was canceled.
#PEND	Asynchronous motion is planned, but is not currently being executed

$ASYNC_T1_FAST — Control of the velocity reduction factor in Test1 mode

Data type	Integer	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	INT $ASYNC_T1_FAST=’B0000’ ;Geschw.-Red. Deaktiviert (T1)		
Comments			

Options	Effect
0	Activated
1	Deactivated

$ASYS — Assignment of the jog keys

Data type	Enum	Value	min.	
Unit			max.	
In file	---			
Original line	DECL ASYS $ASYS ;Verfahrtastenbelegung (ROBOT = Roboter, EXTAX = Externe Achsen)			
Comments				

Options	Effect
#ROBOT	Robot axes A1 – A6
#EXTAX	External axes E1 – E6
#EXTAX2	External kinematic system

$AUT — Signal declaration “Automatic mode”

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	Steu\Mada\$machine.dat			
Original line	SIGNAL $AUT $OUT[995] ;Betriebsart Automatik			
Comments				

$AUX_POWER — Signal declaration for external power supply

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	Steu\Mada\$machine.dat			
Original line	SIGNAL $AUX_POWER $IN[1026] ;Externe Spannungsversorgung aktiv			
Comments	If “$AUX_POWER” has the value “TRUE”, the external power supply is active; if the value is “FALSE”, the external power supply is not active.			

$AX_SIM_ON

Simulation of the closed speed control loop for the individual axes on a desktop PC

Data type	Integer	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	INT $AX_SIM_ON='B111111' ;Achssimulation			
Comments	Bit sequence: LSB: Axis 1 MSB: Axis 12			

$AXIS_ACT

Current axis-specific robot position

Data type	Structure	Value	min.	
Unit	mm, °		max.	
In file	---			
Original line	E6AXIS $AXIS_ACT ;Aktuelle Roboterposition achsspezifisch [mm,Grad]			
Comments				

$AXIS_ACT.A1 ... $AXIS_ACT.A6

Current axis-specific robot position, axis 1 - 6

Data type	Real	Value	min.	0
Unit	mm, °		max.	

$AXIS_ACT.E1 ... $AXIS_ACT.E6

Current axis-specific robot position, external axis 1 - 6

$AXIS_ACTMOD

Display of axis angle modulo 180°

Data type	Structure	Value	min.	
Unit			max.	
In file	---			
Original line	E6AXIS $AXIS_ACTMOD			
Comments				

$AXIS_BACK

Start position of the current motion block, axis-specific

Data type	Structure	Value	min.	
Unit	mm, °		max.	
In file	---			
Original line	E6AXIS $AXIS_BACK ;Anfangsposition des aktuellen Bewegungssatzes achsspezifisch [mm,Grad]			
Comments				

$AXIS_BACK.A1 ... $AXIS_BACK.A6

Start position of the current motion block, axis A1 - A6

Data type	Real	Value	min.	0
Unit	mm, °		max.	

$AXIS_BACK.E1 ... $AXIS_BACK.E6

Start position of the current motion block, external axis E1 - E6

$AXIS_CAL

Display whether axis is referenced

Data type	Structure	Value	min.	
Unit			max.	
In file	---			
Original line	DECL AXIS_CAL $AXIS_CAL			
Comments	Display of referenced axes			

$AXIS_CAL.A1 ... $AXIS_CAL.A6

Display whether axis A1 ... A6 is referenced

Data type	Boolean	Value	min.	
Unit			max.	

Options	Effect
TRUE	Axis is referenced
FALSE	Axis is not referenced

$AXIS_CAL.E1 ... $AXIS_CAL.E6 — **Display whether external axis E1 ... E6 is referenced**

$AXIS_DIR[n] — **Direction of rotation of axis[n]**

Data type	Integer	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	INT $AXIS_DIR[n]			
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6			

Options	Effect
1	Positive direction
-1	Negative direction

$AXIS_FOR — **Target position of the current motion block, axis-specific**

Data type	Structure	Value	min.	
Unit	mm, °		max.	
In file	---			
Original line	E6AXIS $AXIS_FOR ;Zielposition des aktuellen Bewegungssatzes achsspezifisch [mm,Grad]			
Comments				

$AXIS_FOR.A1 ... $AXIS_FOR.A6 — **Target position of the current motion block, axis A1 ... A6**

Data type	Real	Value	min.	0
Unit	mm, °		max.	

$AXIS_FOR.E1 ... $AXIS_FOR.E6 — **Target position of the current motion block, external axis E1 ... E6**

$AXIS_HOME[5]

Definition of the various home positions

Data type	Array	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	E6AXIS $AXIS_HOME[5]			
Comments				

$AXIS_INC

Incremental actual values of the axes

Data type	Structure	Value	min.	
Unit	Increments		max.	
In file	---			
Original line	DECL AXIS_INC $AXIS_INC			
Comments	Indication of the axis position in increments.			

$AXIS_INC.I1 ... $AXIS_INC.I6

Incremental actual value, axis A1 ... A6

Data type	Integer	Value	min.	0
Unit	Increments		max.	

$AXIS_INC.E1 ... $AXIS_INC.E6

Incremental actual value, external axis E1 ... E6

$AXIS_INT

Robot position at the time of an interrupt

Data type	Structure	Value	min.	
Unit	mm, °		max.	
In file	---			
Original line	E6AXIS $AXIS_INT ;Unterbrechungsposition achsspezifisch [mm,Grad]			
Comments				

$AXIS_INT.A1 ... $AXIS_INT.A6

Robot position at the time of an interrupt, axis A1 ... A6

Data type	Real	Value	min.	0
Unit	mm, °		max.	

$AXIS_INT.E1 ... $AXIS_INT.E6

Robot position at the time of an interrupt, external axis E1 ... E6

$AXIS_JUS

Display whether axis is mastered

Data type	Structure	Value	min.	
Unit			max.	
In file	---			
Original line	DECL AXIS_CAL $AXIS_JUS ;Anzeige justierter Achsen			
Comments				

$AXIS_JUS.A1 ... $AXIS_JUS.A6

Display whether axis A1 ... A6 is mastered

Data type	Boolean	Value	min.	
Unit			max.	

Options	Effect
TRUE	Axis mastered
FALSE	Axis not mastered

$AXIS_JUS.E1 ... $AXIS_JUS.E6

Display whether external axis E1 ... E6 is mastered

$AXIS_RESO

Resolution of the position sensing system

Data type	Integer	Value	min.	
Unit	Increments / revolution		max.	
In file	R1\Mada\$machine.dat			
Original line	INT $AXIS_RESO[12] ;Auflösung des Meßsystems Achse(i) (i=1:A1, i=7:E1) [Inkr]			
Comments	Number of pulses per revolution of the encoder			

$AXIS_RET

Axis positions when leaving the programmed path, axis-specific

Data type	Structure	Value	min.	
Unit	mm, °		max.	
In file	---			
Original line	E6AXIS $AXIS_RET ;Rückpositionieren achsspezifisch [mm,Grad]			
Comments				

$AXIS_RET.A1 ... $AXIS_RET.A6

Position of axis A1 ... A6 when leaving the programmed path

Data type	Character	Value	min.	0
Unit	mm, °		max.	

$AXIS_RET.E1 ... $AXIS_RET.E6

Position of external axis E1 ... E6 when leaving the programmed path

$AXIS_SEQ[n]

Change in sequence of axis ... to axis ...

Data type	Integer	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	INT $AXIS_SEQ[n]			
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6			

$AXIS_TYPE[n] Axis identification

Data type	Integer	Value min.	
Unit		max.	
In file	R1\Mada\$machine.dat		
Original line	INT $AXIS_TYPE[n]		
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6		

Options	Effect
1	Linear
2	Spindle
3	Rotational
4	Finitely rotating
5	Infinitely rotating

$AXWORKSPACE[n] Definition of axis-specific workspace monitoring

Data type	Structure	Value min.	
Unit		max.	
In file	R1\Mada\$machine.dat		
Original line	DECL AXBOX$AXWORKSPACE[n]		
Comments	[n] = [1] ... [8]		

$AXWORKSPACE[n].MODE — Functional principle of the axis-specific workspace monitoring function

Data type	Enum	Value	min.
Unit			max.
In file	R1\Mada\$machine.dat		
Original line	DECL AXBOX$AXWORKSPACE[n]		
Comments	[n] = [1] ... [8]		

Options	Effect
#OFF	Work envelope monitoring deactivated
#INSIDE	The output is set if the TCP is located inside the work envelope
#OUTSIDE	The output is set if the TCP is located outside the work envelope
#INSIDE_STOP	The output is set and the robot stopped if the TCP is located inside the work envelope
#OUTSIDE_STOP	The output is set and the robot stopped if the TCP is located outside the work envelope

$AXWORKSPACE[n].STATE — Violation of the axis-specific workspace

Data type	Boolean	Value	min.
Unit			max.

Options	Effect
TRUE	The workspace has been violated
FALSE	The workspace has not been violated

$AXWORKSPACE_NAMEn[] — Name of the particular axis-specific workspace

Data type	Character	Value	min.
Unit			max.
In file	R1\Mada\$machine.dat		
Original line	CHAR $AXWORKSPACE_NAMEn[24] $AXWORKSPACE_NAMEn[]=”AXWORKSPACE_NAME n”		
Comments	[n] = [1] ... [8]		

$AXWORKSTATE1 ... $AXWORKSTATE8

Signal declaration “Violation of workspace”

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	Steu\Mada\$machine.dat			
Original line	SIGNAL $AXWORKSTATE1 $OUT[969] . . SIGNAL $AXWORKSTATE8 $OUT[976] ; Ausgang der Achsarbeitsraumüberwachung .			
Comments				

Options	Effect
$OUT[*n*]	Output 1 ... 4096
FALSE	Outputs that are not required can be set to “FALSE”, e.g. SIGNAL $AXWORKSTATE1 FALSE

3 B

$BASE

Offset and rotation of the base coordinate system in relation to the world coordinate system in the advance run

Data type	Structure	Value	min.	
Unit			max.	
In file	R1\Mada\$operate.dat			
Original line	FRAME $BASE ;Basis im Weltkoordinatensystem Vorlauf			
Comments				

$BASE.A

Rotation of the base coordinate system about the Z axis in relation to the world coordinate system in the advance run

Data type	Real	Value	min.	
Unit	°		max.	

$BASE.B

Rotation of the base coordinate system about the Y axis in relation to the world coordinate system in the advance run

$BASE.C

Rotation of the base coordinate system about the X axis in relation to the world coordinate system in the advance run

$BASE.X

Offset of the base coordinate system in the X direction in relation to the world coordinate system in the advance run

Data type	Real	Value	min.	
Unit	mm		max.	

$BASE.Y

Offset of the base coordinate system in the Y direction in relation to the world coordinate system in the advance run

$BASE.Z

Offset of the base coordinate system in the Z direction in relation to the world coordinate system in the advance run

$BASE_C

Offset and rotation of the base coordinate system in relation to the world coordinate system in the main run

Data type	Structure	Value	min.	
Unit			max.	
In file	---			
Original line	FRAME $BASE_C ;Basis im Weltkoordinatensystem Hauptlauf			
Comments				

$BASE_C.A

Rotation of the base coordinate system about the Z axis in relation to the world coordinate system in the main run

Data type	Real	Value	min.	
Unit	°		max.	

$BASE_C.B

Rotation of the base coordinate system about the Y axis in relation to the world coordinate system in the main run

$BASE_C.C

Rotation of the base coordinate system about the X axis in relation to the world coordinate system in the main run

$BASE_C.X

Offset of the base coordinate system in the X direction in relation to the world coordinate system in the main run

Data type	Real	Value	min.	
Unit	mm		max.	

$BASE_C.Y

Offset of the base coordinate system in the Y direction in relation to the world coordinate system in the main run

$BASE_C.Z

Offset of the base coordinate system in the Z direction in relation to the world coordinate system in the main run

$BASE_KIN

External kinematic / axes in base

Data type	Character	Value	min.	
Unit			max.	
In file	---			
Original line	CHAR $BASE_KIN[29] ;Externe Kinematik / Achsen in Base			
Comments				

$BOUNCE_TIME

Bounce time for EMT signals

Data type	Integer	Value	min.	
Unit	ms		max.	
In file	R1\Mada\$machine.dat			
Original line	INT $BOUNCE_TIME ;Prellzeit für EMT-Taster [ms]			
Comments	The signal is only accepted if it remains stable over the entire time period defined in $BOUNCE_TIME.			

$BRAKE_SIG

Bit array for axis brakes, A1 ... A6 and E1 ... E6

Data type	Integer	Value min.	
Unit		max.	
In file	---		
Original line	INT $BRAKE_SIG ;Bit-Feld Bremsensignale		
Comments			

Options	Effect
0	Brake closed
1	Brake open

$BRK_DEL_COM

Time after which the axis brakes are closed on completion of positioning during jogging

Data type	Integer	Value min.	
Unit	ms	max.	
In file	R1\Mada\$machine.dat		
Original line	INT $BRK_DEL_COM ;Bremsverzögerungszeitkommando-Modus [ms]		
Comments			

$BRK_DEL_EX

Brake delay time for external axes

Data type	Integer	Value min.	
Unit	ms	max.	
In file	R1\Mada\$machine.dat		
Original line	INT $BRK_DEL_EX ;Bremsverzögerungszeit für Zusatzachsen		
Comments			

$BRK_DEL_PRO

Time after which the axis brakes are closed on completion of positioning in the program

Data type	Integer	Value	min.	
Unit	ms		max.	
In file	R1\Mada\$machine.dat			
Original line	INT $BRK_DEL_PRO ;Bremsverzögerungszeit im Programm [ms]			
Comments				

$BRK_MAX_TM

Maximum deceleration time for path-maintaining Emergency Stop

Data type	Integer	Value	min.	
Unit	ms		max.	
In file	R1\Mada\$machine.dat			
Original line	INT $BRK_MAX_TM			
Comments				

$BRK_MODE

Brake control mode

Data type	Integer	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	INT $BRK_MODE='B0101'			

Comments	The bits are counted from right to left. Bit 0: Axes A 1 – A 6 close at command end (bit 0 = 1) / do not close (bit 0 = 0) Bit 1: Axes A 1 – A 6 close individually[1)] (bit 1 = 1) / together (bit 1 = 0) Bit 2: Axes A 1 – A 6 close during pauses in the motion (bit 2 = 1) / do not close (bit 2 = 0) Bit 3: External axis brakes close during motion pauses individually (bit 3 = 1) / together with axes A 1 – A 6 (bit 3 = 0) [1)]Special case

$BRK_OPENTM

Time delay of command value output after axis brakes have been opened

Data type	Integer	Value	min.	
Unit	ms		max.	
In file	R1\Mada\$machine.dat			
Original line	INT $BRK_OPENTM ;Bremsöffnungszeit [ms]			
Comments				

$BUS_PAR

L2 bus interface (KRC32)

Data type	Structure	Value	min.	
Unit			max.	
In file	Steu\Mada\$custom.dat			
Original line	DECL BUS $BUS_PAR={PROTO 1,PROC 5,RCO 5,BL 128,PT 0,TS 1,BAUD 187500,TSL -1,MIN_TDSR -1,MAX_TDSR -1,TTR -1,HSA -1,G -1,DFLT_SAP -1}			
Comments				

4 C

$CABLE2_MON

Additional motor cable monitoring

Data type	Boolean	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	BOOL $CABLE2_MON=FALSE		
Comments	Specifies whether the connection of the second motor cable should be monitored (TRUE for special machines)		

Options	Effect
TRUE	Monitoring activated
FALSE	Monitoring deactivated

$CAL_DIFF

Mastering difference for EMT mastering with check run

Data type	Integer	Value min.	
Unit		Value max.	
In file	---		
Original line	INT $CAL_DIFF ;Justage-Differenz		
Comments			

$CALP

Reference point offset between mathematical zero point and encoder zero point

Data type	Structure	Value min.	0
Unit		Value max.	
In file	---		
Original line	E6AXIS $CALP ;Referenzpunktverschiebung		
Comments			

$CALP.A1 ... $CALP.A6

Reference point offset between mathematical zero point and encoder zero point, axis A1 ... A6

Data type	Real	Value	min.	0
Unit	°		max.	

$CALP.E1 ... $CALP.E6

Reference point offset between mathematical zero point and encoder zero point, external axis E1 ... E6

$CIRC_TYPE

Orientation control with CIRC blocks in the advance run

Data type	Enum	Value	min.	
Unit			max.	
In file	---			
Original line	DECL CIRC_TYPE $CIRC_TYPE ;Bezugssystem für die Orientierungsinterpolation bei CIRC-Sätzen (Vorlauf)			
Comments				

Options	Effect
#BASE	Space-related orientation control
#PATH	Path-related orientation control

$CIRC_TYPE_C

Orientation control with CIRC blocks in the main run

Data type	Enum	Value	min.	
Unit			max.	
In file	---			
Original line	DECL CIRC_TYPE $CIRC_TYPE_C ;Bezugssystem für die Orientierungsinterpolation bei CIRC-Sätzen (Hauptlauf)			
Comments				

Options	Effect
#BASE	Space-related orientation control
#PATH	Path-related orientation control

$CMD

Display assignment number (handle) for command channel

Data type	Integer	Value min.	
Unit		Value max.	
In file	---		
Original line	INT $CMD		
Comments			

$COM_NAME

Command which is to be processed after next start

Data type	Character	Value min.	
Unit		Value max.	
In file	---		
Original line	CHAR $COM_NAME[486] ;Kommando, welches beim nächsten Start abgearbeitet wird		
Comments			

$COM_VAL_MI[n]

Limitation of command speed, axis[n]

Data type	Real	Value min.	
Unit	%	Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $COM_VAL_MI[n]		
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6		

$CONF_MESS

Signal declaration “Reset acknowledgement messages”

Data type	Signal declaration	Value min.	
Unit		Value max.	
In file	Steu\Mada\$machine.dat		
Original line	SIGNAL $CONF_MESS $IN[1026]		
Comments	External confirmation		

$COSYS — Coordinate system for jogging

Data type	Enum	Value min.	
Unit		max.	
In file	---		
Original line	DECL COSYS $COSYS		
Comments			

Options	Effect
#AX	Motions are relative to the axis-specific coordinate system.
#CAR	Motions are relative to the Cartesian coordinate system.

$COUNT_I[n] — Freely usable integer variables

Data type	Integer	Value min.	
Unit		max.	
In file	---		
Original line	INT $COUNT_I[n]		
Comments	[n]=[1] ... [32] Used as counters in the VW package		

$COUP_COMP[N,D] — Axis coupling factors

Data type	Structure	Value min.	
Unit		max.	
In file	R1\Mada\$machine.dat		
Original line	DECL FRA $COUP_COMP[6,6]		
Comments	Axis coupling factor: N = numerator; D = denominator		

$CP_VEL_TYPE — Reduction of the CP path velocity

Data type	Enum	Value min.	
Unit		max.	
In file	Steu\Mada\$custom.dat		
Original line	DECL CP_VEL_TYPE $CP_VEL_TYPE=#CONSTANT		
Comments	If the axis limit values are exceeded, the CP velocity is reduced. Reduction is always active in Cartesian jogging.		

Options	Effect
#Constant	No reduction
#VAR_T1	Reduction in jog mode SStep(T1)
#VAR_ALL	Reduction in all modes

$CPVELREDMELD — Generation of message if path velocity reduced

Data type	Real	Value min.	
Unit		max.	
In file	---		
Original line	INT $CPVELREDMELD		
Comments	The message contains the point name and the maximum reduction in the specific motion command.		

Options	Effect
0	Generation of message deactivated.
1	Generation of message in the event of block change in jog mode.
100	Generation of message in the event of block change in all modes.

$CURR_ACT — Actual current of axes 1 - 12

Data type	Real	Value min.	
Unit	%	max.	
In file	---		
Original line	REAL $CURR_ACT[12] ;Aktueller Motorstrom in %		
Comments	Current value of current of axes 1 - 12 in % of maximum servo drive module current $CURR_MAX (-100% to +100%)		

$CURR_CAL

Current calibration in the power module

Data type	Real	Value	min.
Unit			max.
In file	R1\Mada\$machine.dat		
Original line	REAL $CURR_CAL[12] ;Stromkalibrierung Powermodul (Stromwandler)		
Comments	For KRC 1a and KRC 2, calibration =1		

Options	Effect
1	High power
2	Medium / low power
4	Low power

$CURR_COM_EX

Current limitation for external axes in jog mode

Data type	Real	Value	min.
Unit			max.
In file	R1\Mada\$machine.dat		
Original line	REAL $CURR_COM_EX[6] ;Stromgrenze externer Achsen für Handverfahren		
Comments			

$CURR_LIM[n]

Current limitation, axis[n]

Data type	Integer	Value	min.
Unit	%		max.
In file	R1\Mada\$machine.dat		
Original line	INT $CURR_LIM[n]		
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6		

$CURR_MAX

Maximum effective current on power module output

Data type	Real	Value	min.
Unit	A		max.
In file	R1\Mada\$machine.dat		
Original line	REAL $CURR_MAX[12]		
Comments	Effective current must be present		

$CURR_MON[n] — Permissible rated current

Data type	Real	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $CURR_MON[n] ;Zulässiger Nennstrom		
Comments	Defines the limit for i^2t monitoring for 55 °C [n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6		

$CURR_RED — Current limitation of axes 1 - 12 in % of maximum current

Data type	Real	Value min.	
Unit	%	Value max.	
In file	---		
Original line	REAL $CURR_RED[12,2]		
Comments	1st digit: axis 2nd digit: 1 = positive limit 2 = negative limit		

$CYC_DEF1 ... 32 — Input text for the corresponding cyclical flag

Data type	Character	Value min.	
Unit		Value max.	
In file	---		
Original line	CHAR $CYC_DEF1[470] ... CHAR $CYC_DEF32[470]		
Comments			

$CYCFLAG[n] — Cyclical flags

Data type	Boolean	Value min.	
Unit		Value max.	
In file	---		
Original line	BOOL $CYCFLAG[32]		
Comments	[n]=[1] ... [256] There are 32 cyclical flags available; these flags are cyclically updated independently of program execution. The default value is FALSE.		

5 D

$DATA_SERx

Number of serial receive messages read in the channel x buffer

Data type	Integer	Value min.	
Unit		max.	
In file	---		
Original line	INT $DATA_SER1 ;Zähler für Datenpakete die über: SER1 eintreffen		
Comments			

$DATA_INTEGRITY

A variable of type “Signal” is output either as groups of bits or one bit at a time

Data type	Boolean	Value min.	
Unit		max.	
In file	Steu\Mada\$option.dat		
Original line	BOOL $DATA_INTEGRITY=FALSE ;Signal-Datenkonsistenz Ein/Aus		
Comments	If the signal variable is output as groups of bits, the signal must be defined in one of the defined data objects “OUTB”, “OUTW” or “OUTDW”		

Options	Effect
TRUE	Data are output as groups of bits
FALSE	Data are output one bit at a time

$DATAPATH

Name of the SRC file whose variables in the data list are to be accessed using the variable modification function

Data type	Character	Value min.	
Unit		max.	
In file	---		
Original line	CHAR $DATAPATH[16] ;Kommandocompiler-Suchpfad		
Comments			

$DATE — System time and system date

Data type	Structure	Value min.	
Unit		Value max.	
In file	---		
Original line	DECL DATE $DATE ;Interne Systemzeit		
Comments			

$DECEL_MB — Deceleration time during maximum braking

Data type	Real	Value min.	
Unit	ms	Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $DECEL_MB[12]		
Comments	Braking ramp for dynamic braking [ms]. In maximum braking, the current actual speed value is taken as the command speed value and run down the ramp set in the machine datum $DECEL_MB to zero.		

$DEF_A4FIX — Fixing of axis 4 when palletizing

Data type	Boolean	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	BOOL $DEF_A4FIX=FALSE ;Achse 4 fixiert		
Comments	Defines whether the robot has 5 or 6 axes. When a program is loaded or reset, $PAL_MODE = $DEF_A4FIX is set, i.e. palletizing mode is thus automatically activated for a 5-axis robot and not for a normal 6-axis robot.		

Options	Effect
TRUE	5-axis robot (axis 4 fixed)
FALSE	6-axis robot

$DEF_FLT_CP

Default filter for CP motion

Data type	Integer	Value min.	
Unit		max.	
In file	R1\Mada\$machine.dat		
Original line	INT $DEF_FLT_CP ;Defaultfilter CP		
Comments			

$DEF_FLT_PTP

Default filter for PTP motion

Data type	Integer	Value min.	
Unit		max.	
In file	R1\Mada\$machine.dat		
Original line	INT $DEF_FLT_PTP ;Defaultfilter PTP		
Comments			

$DEF_L_CM

Center of mass frame for the default load on the flange in the flange coordinate system

Data type	Structure	Value min.	
Unit		max.	
In file	R1\Mada\$robcor.dat		
Original line	FRAME $DEF_L_CM={x 230.0,y 0.0,z 210.0,a 0.0,b 0.0,c 0.0} ;Massenschwerpunkt-Frame		
Comments			

$DEF_L_CM.A

Rotation about the Z axis

Data type	Real	Value min.	
Unit		max.	

$DEF_L_CM.B

Rotation about the Y axis

$DEF_L_CM.C

Rotation about the X axis

$DEF_L_CM.X

Offset in the X direction

$DEF_L_CM.Y

Offset in the Y direction

$DEF_L_CM.Z

Offset in the Z direction

$DEF_L_J

Default moment of inertia of the load on the flange in the default center of mass coordinate system of the load

Data type	Structure	Value	min.	
Unit			max.	
In file	R1\Mada\$robcor.dat			
Original line	DECL INERTIA $DEF_L_J={X 17,5,Y 17,5,Z 17,5} ;Eigentraegheitsmomente der Last			
Comments				

$DEF_L_M

Default mass of the load on the flange

Data type	Real	Value	min.	
Unit			max.	
In file	R1\Mada\$robcor.dat			
Original line	REAL $DEF_L_M			
Comments				

$DEF_LA3_CM

Center of mass frame for the default mass of the supplementary load on axis 3 in the flange coordinate system

Data type	Structure	Value	min.	
Unit			max.	
In file	R1\Mada\$robcor.dat			
Original line	FRAME $DEF_LA3_CM={x -505.0,y 0.0,z -1110.0,a 0.0,b 0.0,c 0.0} ;Massenschwerpunkt-Frame A3			
Comments				

$DEF_LA3_CM.A

Rotation about the Z axis

Data type	Real	Value	min.	
Unit			max.	

$DEF_LA3_CM.B

Rotation about the Y axis

$DEF_LA3_CM.C

Rotation about the X axis

$DEF_LA3_CM.X

Offset in the X direction

$DEF_LA3_CM.Y

Offset in the Y direction

$DEF_LA3_CM.Z

Offset in the Z direction

$DEF_LA3_J

Default moment of inertia of the supplementary load on axis 3

Data type	Structure	Value min.	
Unit		Value max.	
In file	R1\Mada\$robcor.dat		
Original line	DECL INERTIA $DEF_LA3_J={X 16,8,Y 16,8,Z 16,8}		
Comments			

$DEF_LA3_M

Default mass of the supplementary load on axis 3

Data type	Real	Value min.	
Unit		Value max.	
In file	R1\Mada\$robcor.dat		
Original line	REAL $DEF_LA3_M		
Comments			

$DEF_OV_JOG

Default value for override in jog mode

Data type	Integer	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	INT $DEF_OV_JOG		
Comments			

$DEVICE

Operator control device status

Data type	Enum	Value min.	
Unit		Value max.	
In file	---		
Original line	DECL DEVICE $DEVICE ;Bediengerätezustand (ACTIVE, BLOCK, PASSIVE, OFF)		
Comments			

Options	Effect
#ACTIVE	
#BLOCK	
#PASSIVE	
#OFF	

$DH_4

Denavit-Hartenberg parameters for the wrist (frame between axes 4 and 5)

Data type	Structure	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	DECL DHART $DH_4={DHART_A 0.0,DHART_D 0.0,DHART_ALPHA 90.0} ;A = Länge A, D = Länge D, ALPHA = Winkel ALPHA		
Comments	Defines the frame between axes 4 and 5.		

$DH_4.DHART_A

Denavit-Hartenberg parameters for the wrist – Length A

Data type	Real	Value min.	
Unit	mm	Value max.	

$DH_4.DHART_D

Denavit-Hartenberg parameters for the wrist – Length D

$DH_4.DHART_ALPHA

Denavit-Hartenberg parameters for the wrist – Angle alpha

Data type	Real	Value min.	
Unit	°	Value max.	

$DH_5

Denavit-Hartenberg parameters for the wrist (frame between A5 and A6)

Data type	Structure	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	DECL DHART $DH_5={DHART_A 0.0,DHART_D 0.0,DHART_ALPHA -90.0} ;A = Laenge A, D = Laenge D, ALPHA = Winkel ALPHA		
Comments	Defines the frame between axes 5 and 6.		

$DH_5.DHART_A

Denavit-Hartenberg parameters for the wrist – Length A

Data type	Real	Value min.	
Unit	mm	Value max.	

$DH_5.DHART_D

Denavit-Hartenberg parameters for the wrist – Length D

$DH_5.DHART_ALPHA

Denavit-Hartenberg parameters for the wrist – Angle alpha

Data type	Real	Value min.	
Unit	°	Value max.	

$DIGIN1 ... $DIGIN6

Signal declaration defining the input to which the digital input "$DIGIN1 ... 6" is assigned

Data type	Signal declaration	Value min.	
Unit		max.	
In file	Steu\Mada\$machine.dat		
Original line	SIGNAL $DIGIN1 $IN[1026] TO $IN[1026] ... SIGNAL $DIGIN6 $IN[1026] TO $IN[1026]		
Comments	Assignment of digital inputs 1 to 6		

$DIGIN1CODE ... $DIGIN6CODE

Defines whether or not the value for "$DIGIN1 ... 6" is preceded by a sign

Data type	Enum	Value min.	
Unit		max.	
In file	Steu\Mada\$machine.dat		
Original line	DECL DIGINCODE $DIGIN1CODE=#UNSIGNED ... DECL DIGINCODE $DIGIN6CODE=#UNSIGNED		
Comments	Sign assignment for $DIGIN1 ... 6		

Options	Effect
#SIGNED	With sign
#UNSIGNED	Without sign

$DIR_CAL

Defines the referencing direction for each axis

Data type	Integer	Value min.	
Unit		max.	
In file	R1\Mada\$machine.dat		
Original line	INT $DIR_CAL='B000111111111' ;Referier-Richtung		
Comments			

Options	Effect
Bit (n)= 0	Reference point of axis n is approached in the positive direction
Bit (n)= 1	Reference point of axis n is approached in the negative direction

$DIRECTION

Direction of the start key – program is executed either forwards or backwards

Data type	Enum	Value min.	
Unit		Value max.	
In file	---		
Original line	DECL DIRECTION $DIRECTION		
Comments			

Options	Effect
#FORWARD	Forwards execution
#BACKWARD	Backwards execution

$DIS_WRP1

Average distance of wrist point from singularity 1 (Alpha 1 singularity)

Data type	Real	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $DIS_WRP1 ;Mittlerer Abstand Handpunkt zur Singularitaet1		
Comments			

$DIS_WRP2

Average distance of wrist point from singularity 2 (Alpha 5 singularity)

Data type	Real	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $DIS_WRP2 ;Mittlerer Abstand Handpunkt zur Singularitaet2		
Comments			

$DISPLAY_REF

New form output when “$DISPLAY_VAR” is changed

Data type	Boolean	Value min.	
Unit		max.	
In file	---		
Original line	BOOL $DISPLAY_REF ;Formularneuausgabe bei Aenderung von $DISPLAY_VAR		
Comments			

$DISPLAY_VAR.NAME[32]

Name of observable variables

Data type	Structure	Value min.	
Unit		max.	
In file	---		
Original line	DECL DISPLAY_VAR $DISPLAY_VAR[32] ;Beobachtbare Variablen		
Comments			

$DISPLAY_VAR[1]...[32]

Observable variables

$DISPLAY_VAR.PATH[12]

Corresponding file list name

Data type	Character	Value min.	
Unit		max.	

$DISPLAY_VAR.TITLE[12]

Name to be displayed for the variable

$DIST_NEXT

Distance still to be covered to the next point

Data type	Real	Value min.	
Unit		max.	
In file	---		
Original line	REAL $DIST_NEXT		
Comments			

$DISTANCE — Curve length, CP motion

Data type	Real	Value min.	
Unit	mm	Value max.	
In file	---		
Original line	REAL $DISTANCE ;Bogenlaenge CP-Bewegung in [mm]		
Comments			

$DRIVE_CART — Option bit: PTP points with Cartesian coordinates

Data type	Boolean	Value min.	
Unit		Value max.	
In file	Steu\Mada\$option.dat		
Original line	BOOL $DRIVE_CART=TRUE ;PTP mit kartesischen Koordinaten		
Comments			

Options	Effect
TRUE	PTP points can have Cartesian coordinates
FALSE	PTP points cannot have Cartesian coordinates

$DRIVE_CP — Option bit: Cartesian robot motion possible (LIN, CIRC)

Data type	Boolean	Value min.	
Unit		Value max.	
In file	Steu\Mada\$option.dat		
Original line	BOOL $DRIVE_CP=TRUE		
Comments			

Options	Effect
TRUE	Cartesian robot motion possible
FALSE	Cartesian robot motion not possible

$DRIVES_OFF

Signal declaration “Drives OFF”

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	Steu\Mada\$machine.dat			
Original line	SIGNAL $DRIVES_OFF $IN[1025]			
Comments	Drives OFF			

$DRIVES_ON

Signal declaration “Drives ON”

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	Steu\Mada\$option.dat			
Original line	SIGNAL $DRIVES_ON $IN[1026]			
Comments	Drives ON			

$DSECHANNEL

Assignment of axes to channels of the digital servoelectronics (DSE)

Data type	Integer	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	INT $DSECHANNEL[12] ;Achszuordnung auf DSE			
Comments				

$DYN_DAT[350]

Model data of the robot for acceleration adaptation, higher motion profile and kinetic energy

Data type	Real	Value	min.	
Unit			max.	
In file	R1\Mada\$robcor.dat			
Original line	REAL $DYN_DAT[350]			
Comments	Contains the model data of the robot, which are required for acceleration adaptation, the higher motion profile and the calculation of kinetic energy (moments of inertia, friction values, etc.)			

6 E

$EMSTOP_ADAP Model-based Emergency Stop

Data type	Boolean	Value	min.	
Unit			max.	
In file	R1\Mada\$robcor.dat			
Original line	BOOL $EMSTOP_ADAP=FALSE ;NOT-AUS mit Dynamikmodell			
Comments	The system variable “$ADAP_ACC” must not be set to “#NONE” (dynamic model for the kinematic system must be present). The path-maintaining EMERGENCY STOP motion for PTP and CP paths is executed with maximum deceleration; this is determined by the motor and gear torques calculated in the dynamic model. External axes are still braked as before, thus affecting the robot axes. Internally, both the new and the old functionality are calculated and compared with one another. If this comparison indicates significantly higher deceleration using the old method (e.g. due to completely incorrect model or load data), braking is carried out using the old functionality.			

Options	Effects
TRUE	Model-based Emergency Stop activated
FALSE	Model-based Emergency Stop not activated (old functionality)

$EMSTOP_GEARTORQ[n] Maximum gear torque for Emergency Stop

Data type	Real	Value	min.	
Unit			max.	
In file	R1\Mada\$robcor.dat			
Original line	REAL $EMSTOP_GEARTORQ[n] ;Max. Getriebemoment bei modellbasiertem NOT-AUS [Nm]			
Comments	[n] = [1] ... [6]			

$EMSTOP_MOTTORQ[n] Maximum motor torque for Emergency Stop

Data type	Real	Value	min.	
Unit			max.	
In file	R1\Mada\$robcor.dat			
Original line	REAL $EMSTOP_MOTTORQ[n] ;Max. Motormomente bei modellbasiertem NOT-AUS [Nm]			
Comments	[n] = [1] ... [6]			

$EMSTOP_PATH

Configuration of path-maintaining Emergency Stop for operating modes T1, T2, AUT, EX

Data type	Structure	Value min.	
Unit		Value max.	
In file	Steu\Mada\$machine.dat		
Original line	DECL EMSTOP_PATH $EMSTOP_PATH={T1 #ON,T2 #ON,AUT #ON,EX #ON} ;Projektierung des bahntreuen NOT-AUS für T1, T2, AUT, EX		
Comments			

Options	Effects
#ON	Path-maintaining emergency stop for the corresponding operating mode is on
#OFF	Path-maintaining emergency stop for the corresponding operating mode is off

$EMSTOP_PATH.AUT

Configuration of path-maintaining Emergency Stop for operating mode “AUT”

Data type	Enum	Value min.	
Unit		Value max.	

Options	Effects
#ON	Path-maintaining emergency stop for operating mode “AUT” is on
#OFF	Path-maintaining emergency stop for operating mode “AUT” is off

$EMSTOP_PATH.EX

Configuration of path-maintaining Emergency Stop for operating mode “EX”

Options	Effects
#ON	Path-maintaining emergency stop for operating mode “EX” is on
#OFF	Path-maintaining emergency stop for operating mode “EX” is off

$EMSTOP_PATH.T1

Configuration of path-maintaining Emergency Stop for operating mode “T1”

Options	Effects
#ON	Path-maintaining emergency stop for operating mode “T1” is on
#OFF	Path-maintaining emergency stop for operating mode “T1” is off

$EMSTOP_PATH.T2

Configuration of path-maintaining Emergency Stop for operating mode “T2”

Options	Effects
#ON	Path-maintaining emergency stop for operating mode “T2” is on
#OFF	Path-maintaining emergency stop for operating mode “T2” is off

$EMSTOP_TIME

Time monitoring for path-maintaining Emergency Stop

Data type	Integer	Value	min.	
Unit	ms		max.	
In file	R1\Mada\$machine.dat			
Original line	INT $EMSTOP_TIME ;Zeitueberwachung für bahntreuen NOT-AUS [ms]			
Comments				

$EMSTOP_TORQRATE

Maximum changing of motor and gear torques

Data type	Real	Value	min.	
Unit			max.	
In file	R1\Mada\$robcor.dat			
Original line	REAL $EMSTOP_TORQRATE ;Max. Aenderung der Momente bei NOT-AUS mit Dynamikmodell [Nm/ms]			
Comments	For setting jolt limitation in the event of a model-based Emergency Stop			

$EMT_MODE

Method for EMT mastering

Data type	Structure	Value	min.	
Unit			max.	
In file	---			
Original line	DECL EMT_MODE $EMT_MODE			
Comments				

Options	Effects
#FIRST_CAL	First mastering
#TOOL_TEACH	Learn tool
#CHECK_CAL	Check
#RECALC_CAL	Restore

$ENDLESS — Flag for infinitely rotating axes

Data type	Boolean	Value min.	
Unit		Value max.	
In file	Steu\Mada\$option.dat		
Original line	BOOL $ENDLESS=TRUE ;Endlos drehende Achsen		
Comments			

Options	Effects
TRUE	Infinitely rotating axes possible
FALSE	Infinitely rotating axes not possible

$ENERGY_MON — Nominal energy monitoring (kinetic energy)

Data type	Boolean	Value min.	
Unit		Value max.	
In file	R1\Mada\$Robcor.dat		
Original line	BOOL $ENERGY_MON=FALSE ;Ueberwachung kinetische Energie bei Crash		
Comments			

Options	Effects
TRUE	Energy monitoring activated
FALSE	Energy monitoring deactivated

$ERROFFMASK — Removal of individual error bits

Data type	Integer	Value min.	
Unit		Value max.	
In file	---		
Original line	INT $ERROFFMASK[12] ;Abschaltung einzelner Fehlerbits		
Comments			

$ERSYSROOT

Offset and orientation of the robot when external axes are present, with reference to the world coordinate system

Data type	Structure	Value min.	
Unit	mm, °	Value max.	
In file	R1\Mada\$machine.dat		
Original line	FRAME $ERSYSROOT={x 0.0,y 0.0,z 0.0,a 0.0,b 0.0,c 0.0} ;Roboterfußpunktkinematik im Weltkoordinatensystem [mm,Grad]		
Comments	Only valid when external axes are present. If “$ERSYSROOT” is valid, then “$ROBROOT” will be ignored.		

$ET1_AX ... $ET6_AX

Assignment of external axes to external axis kinematic system ET1 ... ET6

Data type	Enum	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	DECL ET_AX $ET1_AX={TR_A1 #NONE,TR_A2 #NONE,TR_A3 #NONE} ... DECL ET_AX $ET6_AX={TR_A1 #NONE,TR_A2 #NONE,TR_A3 #NONE} ;Externe Achsen #NONE, #E1, #E2, #E3, #E4, #E5, #E6		
Comments	List of external axes used in the 1st ... 6th external transformations ET1 ... ET6.		

Options	Effects
#NONE	
#E1 – #E6	

$ET1_NAME ... $ET6_NAME

Name of external axis kinematic system ET1 ... ET6

Data type	Character	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	CHAR $ET1_NAME[20] ... CHAR $ET6_NAME[20]		
Comments	The name can have a maximum length of 20 characters.		

$ET1_TA1KR
...
$ET6_TA1KR

Offset between axis 1 and the root of the external axis kinematic system ET1 ... ET6

Data type	Structure	Value min.	
Unit	mm, °	Value max.	
In file	R1\Mada\$machine.dat		
Original line	FRAME $ET1_TA1KR={x 0.0,y 0.0,z 0.0,a 0.0,b 0.0,c 0.0} ... FRAME $ET6_TA1KR={x 0.0,y 0.0,z 0.0,a 0.0,b 0.0,c 0.0}		
Comments	FRAME between A1 and root point of KIN in transformation ET1 ... ET6.		

$ET1_TA2A1
...
$ET6_TA2A1

Offset between axis 2 and axis 1 of the external axis kinematic system ET1 ... ET6

Data type	Structure	Value min.	
Unit	mm, °	Value max.	
In file	R1\Mada\$machine.dat		
Original line	FRAME $ET1_TA2A1={x 0.0,y 0.0,z 0.0,a 0.0,b 0.0,c 0.0} ... FRAME $ET6_TA2A1={x 0.0,y 0.0,z 0.0,a 0.0,b 0.0,c 0.0}		
Comments			

$ET1_TA3A2
...
$ET6_TA3A2

Offset between axis 3 and axis 2 of the external axis kinematic system ET1 ... ET6

Data type	Structure	Value min.	
Unit	mm, °	Value max.	
In file	R1\Mada\$machine.dat		
Original line	FRAME $ET1_TA3A2={x 0.0,y 0.0,z 0.0,a 0.0,b 0.0,c 0.0} ... FRAME $ET6_TA3A2={x 0.0,y 0.0,z 0.0,a 0.0,b 0.0,c 0.0}		
Comments			

$ET1_TFLA3 ... $ET6_TFLA3

Offset between flange and axis 3 of the external axis kinematic system ET1 ... ET6

Data type	Structure	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	FRAME $ET1_TFLA3={x 0.0,y 0.0,z 0.0,a 0.0,b 0.0,c 0.0} ... FRAME $ET6_TFLA3={x 0.0,y 0.0,z 0.0,a 0.0,b 0.0,c 0.0}		
Comments			

$ET1_TPINFL ... $ET6_TPINFL

Offset between reference point and flange of the external axis kinematic system ET1 ... ET6

Data type	Structure	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	FRAME $ET1_TPINFL={x 0.0,y 0.0,z 0.0,a 0.0,b 0.0,c 0.0} ... FRAME $ET6_TPINFL={x 0.0,y 0.0,z 0.0,a 0.0,b 0.0,c 0.0}		
Comments			

$EX_AX_ASYNC

Switch external axes to asynchronous motion

Data type	Integer	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	INT $EX_AX_ASYNC='B000000' ;Externe Achsen asynchron		
Comments			

Options	Effects
Bit = 1	Axis asynchronous, Bit 0 external axis E1 to Bit 5 external axis E6

$EX_AX_NUM — Number of external axes

Data type	Integer	Value	min.	0
Unit			max.	6
In file	R1\Mada\$machine.dat			
Original line	INT $EX_AX_NUM=0 ;Anzahl externer Achsen (0–6)			
Comments				

$EX_KIN — Assignment of external base coordinate system to external axis kinematic system

Data type	Structure	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	DECL EX_KIN $EX_KIN={ET1 #NONE,ET2 #NONE,ET3 #NONE,ET4 #NONE,ET5 #NONE,ET6 #NONE} ;Externe Kinematiken #NONE,#EASYS,#EBSYS,#ECSYS,#EDSYS,#EESYS,#EFSYS,#ERSYS			
Comments				

$EXCOUP_COMP — Coupling factors of axes 7 (index 1) to 12 (index 6)

Data type	Array	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	DECL FRA $EXCOUP_COMP[6,6] ;Kopplungsfaktoren Achse 7 (Index 1) bis Achse 12 (Index12), N = Zaehler, D =Nenner			
Comments	N = numerator; D = denominator			

$EXT — Signal declaration “External mode”

Data type	Signal declaration	Value min.	
Unit		max.	
In file	Steu\Mada\$machine.dat		
Original line	SIGNAL $EXT $OUT[996] ;Betriebsart extern		
Comments			

Options	Effects
TRUE	Operating mode EXTERNAL
FALSE	Other operating mode

$EXT_AXIS — Display whether external axes are present

Data type	Boolean	Value min.	
Unit		max.	
In file	Steu\Mada\$option.dat		
Original line	BOOL $EXT_AXIS=FALSE		
Comments			

Options	Effects
TRUE	External axes present
FALSE	No external axes present

$EXT_START — Signal declaration “External start active”

Data type	Signal declaration	Value min.	
Unit		max.	
In file	Steu\Mada\$machine.dat		
Original line	SIGNAL $EXT_START $IN[1026] ;Externer Start		
Comments			

$EXTSTARTTYP

Flag for automatic mode without external signals

Data type	Boolean	Value min.	
Unit		Value max.	
In file	---		
Original line	BOOL $EXTSTARTTYP		
Comments			

Options	Effects
TRUE	Automatic mode possible
FALSE	Automatic mode not possible

7 F

$FAN_FOLLOW_UP_TIME Signal declaration “Fan monitoring”

Data type	Signal declaration	Value	min.	5.0
Unit			max.	1000.0
In file	Steu\Mada\$machine.dat			
Original line	REAL $FAN_FOLLOW_UP_TIME			
Comments	Follow-up time for fan control. When a defined temperature is reached, the external fan is activated for a preset length of time. If the follow-up time is set to “1000.0”, the fan runs continuously.			

$FFC_TORQ Torque feed forward control

Data type	Boolean	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	BOOL $FFC_TORQ=FALSE ;Momentenvorsteuerung EIN/AUS			
Comments				

Options	Effects
TRUE	Torque feed forward control activated
FALSE	Torque feed forward control not activated

$FFC_VEL Velocity feed forward control

Data type	Integer	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	INT $FFC_VEL=’B000000’ ;Geschwindigkeitsvorsteuerung EIN/AUS			
Comments				

Options	Effects
0	Off, LSB: axis 1, MSB: axis 12
1	On

$FILTER

Smooth ramp in advance run

Data type	Integer	Value	min.	0
Unit			max.	16
In file	---			
Original line	INT $FILTER			
Comments	The filter prevents abrupt acceleration to the maximum acceleration value of 16 interpolation cycles.			

$FILTER_C

Smooth ramp in main run

Data type	Integer	Value	min.	0
Unit			max.	16
In file	---			
Original line	INT $FILTER_C			
Comments	The current filter value is displayed.			

$FLAG[1]...[1024]

Flags 1 to 1024 as global markers

Data type	Boolean	Value	min.	0
Unit			max.	
In file	---			
Original line	BOOL $FLAG[1024]			
Comments	Are used as global markers and initialized with FALSE			

Options	Effects
TRUE	
FALSE	

$FOL_ERR_MA

Factor for following error monitoring

Data type	Real	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	REAL $FOL_ERR_MA[12] ;Faktor fuer Schleppfehlerueberwachung			
Comments				

$FOL_ERROR[n] Velocity-related axis following error

Data type	Real	Value	min.	0
Unit	ms		max.	
In file	---			
Original line	REAL $FOL_ERROR[n] ;Bezogener Schleppfehler			
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6			

8 G

$G_COE_CUR[n] — Proportional gain of the current controller

Data type	Integer	Value	min.	1
Unit	%		max.	100
In file	R1\Mada\$machine.dat			
Original line	INT $G_COE_CUR[n]			
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6			

$G_VEL_CAL[n] — Velocity factor for speed controller gain

Data type	Real	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	REAL $G_VEL_CAL[n]			
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6			

$G_VEL_CP[n] — Velocity factor for speed controller gain

Data type	Real	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	REAL $G_VEL_CP[n]			
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6			

$G_VEL_PTP[n] — Proportional gain of the speed controller for PTP motion

Data type	Real	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	REAL $G_VEL_PTP[n]			
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6			

$GEARTORQ_MON

Control of gear torque monitoring

Data type	Boolean	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	BOOL $GEARTORQ_MON=FALSE			
Comments				

Options	Effects
TRUE	Activated using the limits (% of the maximum accelerating torques) defined in the data $DYN_DAT[231] ... $DYN_DAT[236] in $robcor.dat
FALSE	Controller OFF

9 H

$H_POS

Home position of the robot

Data type	Structure	Value min.	
Unit	mm, °	Value max.	
In file	R1\Mada\$machine.dat		
Original line	E6AXIS $H_POS={a1 0.0,a2 -90.0,a3 90.0,a4 0.0,a5 0.0,a6 0.0,e1 0.0,e2 0.0,e3 0.0,e4 0.0,e5 0.0,e6 0.0}		
Comments			

$H_POS_TOL

Permissible tolerance for “Robot in home position”

Data type	Structure	Value min.	
Unit	mm, °	Value max.	
In file	R1\Mada\$machine.dat		
Original line	E6AXIS $H_POS_TOL={a1 2.0,a2 2.0,a3 2.0,a4 2.0,a5 2.0,a6 2.0,e1 2.0,e2 2.0,e3 2.0,e4 2.0,e5 2.0,e6 2.0}		
Comments			

$HOME[3]

HOME directory setting of the compiler

Data type	Character	Value min.	
Unit		Value max.	
In file	---		
Original line	CHAR $HOME[3] ;HOME-Einstellung (/ = Steuerungsspezifisch, /R1 = Rob.System 1, /R2 = Rob.System 2)		
Comments			

Options	Effects
/R1	Robot system 1
/R2	Robot system 2

$HW_WARNING — Signal declaration “Hardware warning”

Data type	Signal declaration	Value	min.	FALSE, 1
Unit			max.	4096
In file	Steu\Mada\$machine.dat			
Original line	SIGNAL $HW_WARNING $OUT[148] ;Projektierbare Systemvariable			
Comments	As soon as a hardware warning occurs, the configured output is set Reacts to 268: Warning: PC fan speed 284: Warning: battery voltage 1066: Warning: motherboard temperature			

Options	Effects
FALSE	No output is set
1 ... 4096	The relevant output is set

$HWEND — Signal declaration “Limit switch tripped”

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	Steu\Mada\$machine.dat			
Original line	SIGNAL $HWEND $IN[1002] ;HW-Endschalter für alle Achsen			
Comments				

10 I

$I_O_ACT

Signal declaration “I/O interfaces active”

Data type	Signal declaration	Value min.	
Unit		max.	
In file	Steu\Mada\$machine.dat		
Original line	SIGNAL $I_O_ACT $IN[1025] ;E/A-Schnittstelle aktiv		
Comments			

$I_O_ACTCONF

Signal declaration “External device active”

Data type	Signal declaration	Value min.	
Unit		max.	
In file	Steu\Mada\$machine.dat		
Original line	SIGNAL $I_O_ACTCONF $OUT[1009] ;E/A-Schnittstelle aktiv Quittung		
Comments			

$I_VEL_CP[n]

Integral factor of the speed controller for CP motion

Data type	Real	Value min.	
Unit		max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $I_VEL_CP[n]		
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6		

$I_VEL_PTP[n]

Integral factor of the speed controller for PTP motion

Data type	Real	Value min.	
Unit		max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $I_VEL_PTP[n]		
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6		

$IBS_SLAVEIN[10] Controller input words assigned by the Interbus slave

Data type	Integer	Value min.	
Unit		max.	
In file	Steu\Mada\$custom.dat		
Original line	INT $IBS_SLAVEIN[10]		
Comments			

$IBUS_OFF Switches off alternative Interbus groups

Data type	Integer	Value min.	
Unit		max.	
In file	Steu\Mada\$custom.dat		
Original line	INT $IBUS_OFF		
Comments			

$IBUS_ON Switches on alternative Interbus groups

Data type	Integer	Value min.	
Unit		max.	
In file	Steu\Mada\$custom.dat		
Original line	INT $IBUS_ON		
Comments			

$IDENT_OPT Query whether load data determination can be carried out

Data type	Boolean	Value min.	
Unit		max.	
In file	Steu\Mada\$option.dat		
Original line	BOOL $IDENT_OPT=FALSE		
Comments			

Options	Effects
TRUE	Load data determination is possible
FALSE	Load data determination is not possible

$IDENT_STARTP — Start position for load data determination

Data type	Structure	Value min.	
Unit		Value max.	
In file	R1\Mada\$operate.dat		
Original line	E6AXIS $IDENT_STARTP		
Comments			

$IDENT_STATE — Status of load data determination

Data type	Enum	Value min.	
Unit		Value max.	
In file	Steu\Mada\$operate.dat		
Original line	DECL IDENT_STATE $IDENT_STATE		
Comments			

Options	Effects
#I_END	Load data determination terminated
#I_READY	Ready for load data determination
#I_TEST	Test run is being carried out
#I_MEAS	Measurement is being carried out
#I_MEAS_OK	Measurement was error-free
#I_CALC	Calculation is being carried out

$IN[n] — Inputs

Data type	Boolean	Value min.	
Unit		Value max.	
In file	---		
Original line	BOOL $IN[4096] ;Eingang [1 bis 4096]		
Comments	[n]=[1] ... [4096] The number of inputs can be increased to max. 4096 by setting $SET_IO_SIZE accordingly.		

$IN_HOME

Signal declaration “Robot in home position”

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	Steu\Mada\$machine.d			
Original line	SIGNAL $IN_HOME $OUT[1000]			
Comments				

$IN_HOME1 ... $IN_HOME5

Signal declaration “Home position1 ... 5”

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	Steu\Mada\$machine.dat			
Original line	SIGNAL $IN_HOME1 $OUT[977] ... SIGNAL $IN_HOME5 $OUT[981]			
Comments				

$IN_POS_MA[n]

Positioning window for following error monitoring

Data type	Real	Value	min.	
Unit	mm, °		max.	
In file	R1\Mada\$machine.dat			
Original line	REAL $IN_POS_MA[n]			
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6			

$IN_STILL_MA

Factor for calculating the standstill window

Data type	Integer	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	INT $IN_STILL_MA			
Comments	If all axes are in position and no new setpoint is defined, the axes are monitored to make sure they do not wander out of position.			

$INC_AXIS[1]...[6]

Incremental dimension, axis-specific – for axes A1 ... A6

Data type	Real	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $INC_AXIS[6]		
Comments			

$INC_CAR[1]...[6]

Incremental dimension, Cartesian, relative to the tool, for axes A1 ... A6

Data type	Real	Value min.	
Unit	mm, °	Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $INC_CAR[6]		
Comments			

$INC_EXTAX

Incremental dimension (axis-specific) for external axes

Data type	Real	Value min.	
Unit	mm, °	Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $INC_EXTAX[6]		
Comments			

$INPOSITION

Bit array for “Axis in position” of all axes, A1 ... A6, E1 ... E6

Data type	Integer	Value min.	
Unit		Value max.	
In file	---		
Original line	INT $INPOSITION		
Comments			

Options	Effects
Bit=0	Axis in motion
Bit=1	Axis in positioning window

$INTERPRETER

Selection of the Submit or robot interpreter

Data type	Integer	Value min.	
Unit		max.	
In file	---		
Original line	INT $INTERPRETER		
Comments			

Options	Effects
0	Submit interpreter
1	Robot interpreter

$INTERRUPT

Program is processing an interrupt

Data type	Boolean	Value min.	
Unit		max.	
In file	R1\Mada\$operate.dat		
Original line	BOOL $INTERRUPT ;Interruptbearbeitung		
Comments			

$IOSIM_OPT

Simulation of inputs/outputs

Data type	Boolean	Value min.	
Unit		max.	
In file	---		
Original line	BOOL $IOSIM_OPT		
Comments			

Options	Effects
TRUE	I/O simulation activated
FALSE	I/O simulation deactivated

$IPO_MODE

Advance run interpolation mode

Data type	Enum	Value min.	
Unit		Value max.	
In file	---		
Original line	DECL IPO_MODE $IPO_MODE ;Interpolationsart Vorlauf		
Comments			

Options	Effects
#BASE	
#TCP	

$IPO_MODE_C

Main run interpolation mode

Data type	Enum	Value min.	
Unit		Value max.	
In file			
Original line	DECL IPO_MODE $IPO_MODE_C ;Interpolationsart Hauptlauf		
Comments			

Options	Effects
#BASE	
#TCP	

$ITER

Number of iterations for path planning with activated acceleration adaptation and higher motion profile

Data type	Integer	Value min.	
Unit		Value max.	
In file	R1\Mada\$robcor.dat		
Original line	INT $ITER ;Anzahl der Iterationen		
Comments			

11 J

$JUS_TOOL_NO	Number of the current tool for EMT mastering

Data type	Integer	Value min.	
Unit		max.	
In file	Steu\Mada\$operate.dat		
Original line	INT $JUS_TOOL_NO		
Comments			

12 K

$KCP_CONNECT

Display whether the KCP is connected to the controller

Data type	Boolean	Value min.	
Unit		max.	
In file	---		
Original line	BOOL $KCP_CONNECT		
Comments			

Options	Effects
TRUE	KCP is connected
FALSE	KCP is not connected

$KEYMOVE

Assignment of jog keys to axes

Data type	Structure	Value min.	
Unit		max.	
In file	---		
Original line	DECL KEYMOVE $KEYMOVE		
Comments	These six fields (T1 to T6) are used to store which axis is moved using which of the corresponding plus-minus rockers. Whether or not the jog keys are active depends on the state of the system variable $KEYMOVE.		

$KEYMOVE.T1 ... $KEYMOVE.T6

Status of plus/minus key 1 ... 6 (from top on the KCP)

Data type	Integer	Value min.	
Unit		max.	
In file	---		
Original line	STRUC KEYMOVE INT T1,T2,T3,T4,T5,T6		
Comments			

$KINCLASS — Kinematic classes

Data type	Enum	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	DECL KINCLASS $KINCLASS=#STANDARD ;Kinematikklassen (STANDARD,SPECIAL,TEST,NONE)		
Comments			

Options	Effects
#STANDARD	
#SPECIAL	
#TEST	
#NONE	

$KPS_CURR_MAX[8] — Maximum current of a KPS over 1 second

Data type	Real	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $KPS_CURR_MAX[8] ;Maximalstrom eines KPS über 1 s		
Comments	KPS = **K**UKA **P**ower **S**upply		

$KPS_CURR_RATED[8] — Rated current of KPS for a duration of 60 seconds

Data type	Real	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $KPS_CURR_RATED[8] ;Nennstrom eines KPS über 60 s		
Comments	KPS = **K**UKA **P**ower **S**upply		

$KR_SERIALNO

Serial number of the robot

Data type	Integer	Value min.	
Unit		Value max.	
In file	---		
Original line	INT $KR_SERIALNO ;Roboter-Seriennummer		
Comments			

$KT_MOT

KT factor of motors (relationship between current and torque)

Data type	Real	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $KT_MOT[12] ;KT-Faktor der Motoren		
Comments			

$KT0_MOT[n]

KT0 factor of servomotors (defined at working point with speed=0)

Data type	Real	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $KT0_MOT[n]		
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6		

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$L_EMT_MAX[n] Maximum length of EMT mastering travel

Data type	Real	Value min.	
Unit	mm, °	Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $L_EMT_MAX[n]		
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6 If the travel length is exceeded, an error message will be displayed.		

$LAST_BUFFERING_NOTOK Signal declaration “Battery message”

Data type	Signal declaration	Value min.	
Unit		Value max.	
In file	Steu\Mada\$machine.dat		
Original line	SIGNAL $LAST_BUFFERING_NOTOK $OUT[1003] ;Ausgang signalisiert eine anstehende Akkumeldung		
Comments	If the variable “$LAST_BUFFERING_NOTOK” has the value “TRUE”, the battery voltage was too low the last time the system was shut down. Otherwise, the value is “FALSE”.		

$LENGTH_A Main axis length A, eccentricity of axis 2 relative to axis 1

Data type	Real	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $LENGTH_A ;Grundachslaenge A		
Comments			

$LENGTH_B

Main axis length B, link arm length

Data type	Real	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $LENGTH_B ;Grundachslaenge B		
Comments			

$LG_CP

Proportional gain of the position controller for CP motion

Data type	Real	Value min.	
Unit	1/ms	Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $LG_CP[12] ;KV-Faktor Bahn-fahren [1/ms]		
Comments			

$LG_PTP

Proportional gain of the position controller for PTP motion

Data type	Real	Value min.	
Unit	1/ms	Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $LG_PTP[12] ;KV-Faktor PTP Achse [I] (i=1:A1,i=7:E1) [1/ms]		
Comments			

$LINE_SEL_OK

Display whether block selection was successful

Data type	Boolean	Value min.	
Unit		Value max.	
In file	---		
Original line	BOOL $LINE_SEL_OK		
Comments			

Options	Effects
TRUE	Block selection took place
FALSE	Block selection did not take place

$LINE_SELECT

Editing with or without implicit block selection

Data type	Boolean	Value min.	
Unit		max.	
In file	---		
Original line	BOOL $LINE_SELECT		
Comments			

Options	Effects
TRUE	Editing with block selection
FALSE	Editing without block selection

$LOOP_CONT

Results of simulation for loop termination condition

Data type	Boolean	Value min.	
Unit		max.	
In file	---		
Original line	BOOL $LOOP_CONT=FALSE		
Comments	Simulation result which can be used as loop termination condition. $LOOP_CONT receives the value FALSE as soon as the simulation key is pressed. The value must be set to TRUE before using $LOOP_MSG to start a simulation.		

Options	Effects
TRUE	Simulation key pressed
FALSE	Simulation key not pressed

$LOOP_MSG

Start simulation if value not equal to blank string

Data type	Character	Value min.	
Unit		max.	
In file	Steu\Mada\$option.dat		
Original line	CHAR $LOOP_MSG[128]		
Comments	Starts the simulation as soon as the value is not equal to blank string, and causes the text contained and the simulation key to be displayed. To end the simulation, the value must be reset to blank string.		

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$MAIN_AXIS — Main axis identification

Data type	Enum	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	DECL MAIN_AXIS $MAIN_AXIS=#NR ;Grundachsenkennung (SS = Portal, CC = Scara, NR = Gelenkroboter)		
Comments			

Options	Effect
#SS	Gantry robot
#CC	SCARA robot
#NR	Jointed-arm robot

$MAMES[n] — Offset between mechanical and mathematical zero of axis n

Data type	Real	Value min.	
Unit	mm, °	Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $MAMES[n]		
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6		

$MEAS_PULSE — Activate rapid gauging

Data type	Boolean	Value min.	
Unit		Value max.	
In file	---		
Original line	BOOL $MEAS_PULSE[5] ;Messpuls		
Comments			

$MODE_MOVE — Motion type in jog mode

Data type	Enum	Value	min.	
Unit			max.	
In file	---			
Original line	DECL MODE_MOVE $MODE_MOVE			
Comments				

Options	Effect
#MM	Jogging
#MC	Manual referencing
#MI	Incremental motion

$MODE_OP — Display current operating mode

Data type	Enum	Value	min.	
Unit			max.	
In file	---			
Original line	DECL MODE_OP $MODE_OP ;Betriebsart (T1, T2, AUT, EX)			
Comments				

Options	Effect
#T1	Test 1
#T2	Test 2
#AUT	Automatic
#EX	Automatic External

$MODEL_NAME — Robot type

Data type	Character	Value	min.	
Unit			max.	
In file	R1\Mada\$robcor.dat			
Original line	CHAR $MODEL_NAME[32]			
Comments	Defines the robot type.			

$MOUSE_ACT

Status of the Space Mouse

Data type	Boolean	Value	min.	
Unit			max.	
In file	---			
Original line	BOOL $MOUSE_ACT			
Comments				

Options	Effect
TRUE	Space Mouse active
FALSE	Space Mouse not active

$MOUSE_DOM

Mode for Space Mouse
Dominant coordinate / All coordinates

Data type	Boolean	Value	min.	
Unit			max.	
In file	---			
Original line	BOOL $MOUSE_DOM			
Comments				

Options	Effect
TRUE	Space Mouse in mode “Dominant coordinate active”
FALSE	Space Mouse in mode “All coordinates active”

$MOUSE_ROT

Space Mouse – set rotational motions to active

Data type	Boolean	Value	min.	
Unit			max.	
In file	---			
Original line	BOOL $MOUSE_ROT			
Comments				

Options	Effect
TRUE	Space Mouse “rotational” motions switched on
FALSE	Space Mouse “rotational” motions switched off

$MOUSE_TRA

Space Mouse – set translational motions to active

Data type	Boolean	Value min.	
Unit		max.	
In file	---		
Original line	BOOL $MOUSE_TRA		
Comments			

Options	Effect
TRUE	Space Mouse “translational” motions switched on
FALSE	Space Mouse “translational” motions switched off

$MOVE_BCO

Block coincidence run (BCO)

Data type	Boolean	Value min.	
Unit		max.	
In file	---		
Original line	BOOL $MOVE_BCO ;Aktuelle Bewegung ist SAK-Fahrt		
Comments			

Options	Effect
TRUE	Current motion is BCO run
FALSE	No BCO run

$MOVE_ENABLE

Signal declaration “Move enable”

Data type	Signal declaration	Value min.	
Unit		max.	
In file	Steu\Mada\$machine.dat		
Original line	SIGNAL $MOVE_ENABLE $IN[1025] ;Fahrfreigabe gesamt		
Comments			

$MOVE_ENA_ACK — Move enable signal feedback signal

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	Steu\Mada\$machine.dat			
Original line	SIGNAL $MOVE_ENA_ACK $OUT[150] ;Rueckmeldung $MOVE_ENABLE an PLC			
Comments				

$MOVE_STATE — Current status of motion

Data type	Enum	Value	min.	
Unit			max.	
In file	---			
Original line	DECL MOVE_STATE $MOVE_STATE			
Comments	$MOVE_STATE is used in path planning to identify the individual motion path sections. In the case of RESET, CANCEL, block selection and no program selected, $MOVE_STATE has the value #NONE. $MOVE_STATE is composed of two parts. The first is the designation of the specific type of motion (PTP, LIN, CIRC), and the second is the identifier of the current section of the path. #xxx_SINGLE designates a motion outside an approximate positioning range; #xxx_APO1 designates a motion inside an approximate positioning range up to the middle of the block; #xxx_APO2 designates a motion inside an approximate positioning range after the middle of the block; #NONE designates the state with no program selected, in the case of RESET or CANCEL.			

$MS_DA[n] — Status of position control monitoring

Data type	Integer	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	INT $MS_DA[n]			
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6			

$MSG_T

Structure for message display

Data type	Structure	Value min.	
Unit		Value max.	
In file	Steu\Mada\$option.dat		
Original line	DECL MSG_T $MSG_T={VALID FALSE,RELEASE FALSE,TYP #NOTIFY,MODUL[] " ",KEY[] " ",PARAM_TYP #VALUE,PARAM[] " ",DLG_FORMAT[] " ",ANSWER 0}		
Comments			

$MSG_T.ANSWER

Number of the softkey pressed

Data type	Integer	Value min.	
Unit		Value max.	

$MSG_T.DLG_FORMAT

Label of the softkeys

Data type	Character	Value min.	
Unit		Value max.	

$MSG_T.KEY

Key to the message text in the data bank

$MSG_T.MODUL

Module identifier for access to database

$MSG_T.PARAM

Additional parameter displayed with the message text

$MSG_T.PARAM_TYP

"PARAM" type definition

Data type	Enum	Value min.	
Unit		Value max.	

Options	Effect
#VALUE	
#WORDS	
#KEY	

$MSG_T.RELEASE

Deletion of status message

Data type	Boolean	Value min.	
Unit		Value max.	

$MSG_T.TYP

Definition of message type

Data type	Enum	Value	min.	
Unit			max.	

Options	Effect
#NOTIFY	Notification message
#STATE	Status message
#QUIT	Acknowledgment message
#DIALOG	Dialog query

$MSG_T.VALID

Output of message text

Data type	Boolean	Value	min.	
Unit			max.	

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$NEAR_POSRET

Robot is within a sphere about “$POS_RET” (tolerance window)

Data type	Signal declaration	Value min.	
Unit		Value max.	
In file	Steu\Mada\$machine.dat		
Original line	SIGNAL $NEAR_POSRET $OUT[997] ;Roboter in Toleranzfenster		
Comments	Signal is set if the robot is positioned within a sphere about $POS_RET. The radius of this sphere is defined in $NEARPATHTOL.		

$NEARPATHTOL

Radius of the sphere about “$POS_RET”

Data type	Real	Value min.	
Unit		Value max.	
In file	Steu\Mada\$custom.dat		
Original line	REAL $NEARPATHTOL ;Toleranz für die Abweichung von $POS_RET		
Comments			

$NULLFRAME

Null frame

Data type	Structure	Value min.	
Unit		Value max.	
In file	---		
Original line	FRAME $NULLFRAME		
Comments	All values for offset (X, Y, Z) and rotation (A, B, C) are set to zero.		

$NULLFRAME.A — **Rotation about the Z axis**

Data type	Real	Value	min.	
Unit	mm, °		max.	

$NULLFRAME.B — **Rotation about the Y axis**

$NULLFRAME.C — **Rotation about the X axis**

$NULLFRAME.X — **Offset in the X direction**

$NULLFRAME.Y — **Offset in the Y direction**

$NULLFRAME.Z — **Offset in the Z direction**

$NUM_AX — **Number of robot axes**

Data type	Integer	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	INT $NUM_AX=6 ;Achsen des Robotersystems			
Comments				

$NUM_IN — **Maximum number of digital inputs ($IN)**

Data type	Integer	Value	min.	
Unit			max.	
In file	---			
Original line	INT $NUM_IN ;Anzahl der Eingaenge			
Comments				

$NUM_OUT — **Maximum number of digital outputs ($OUT)**

Data type	Integer	Value	min.	
Unit			max.	
In file	---			
Original line	INT $NUM_OUT ;Anzahl der Ausgaenge			
Comments				

$NUMSTATE State of the Num Lock key

Data type	Boolean	Value min.	
Unit		max.	
In file	---		
Original line	BOOL $NUMSTATE		
Comments			

Options	Effect
TRUE	Num Lock key on
FALSE	Num Lock key off

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$ON_PATH

Signal declaration “Path check” – robot is on the programmed path

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	Steu\Mada\$machine.dat			
Original line	SIGNAL $ON_PATH $OUT[997]			
Comments				

$OPT_MOVE

Activation of the higher motion profile

Data type	Enum	Value	min.	
Unit			max.	
In file	R1\Mada\$robcor.dat			
Original line	DECL ADAP_ACC $OPT_MOVE=#NONE			
Comments				

Options	Effect
#NONE	Higher motion profile deactivated
#STEP1	Higher motion profile without energy planning activated
#STEP2	Higher motion profile with energy planning activated

$OPT_VAR_IDX

Index of selected correction variables from the list “$OPT_VAR[]”

Data type	Integer	Value	min.	
Unit			max.	
In file	---			
Original line	INT $OPT_VAR_IDX ;Index Korr.-Var. in der Var.-Liste $OPT_VAR[]			
Comments				

$ORI_CHECK

Orientation check at CP end points (only with five-axis robots)

Data type	Integer	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	INT $ORI_CHECK		
Comments			

$ORI_TYPE

Orientation control for CP instructions (LIN, CIRC) in the advance run

Data type	Enum	Value min.	
Unit		Value max.	
In file	---		
Original line	DECL ORI_TYPE $ORI_TYPE ;Orientierungsfuehrung bei CP-Saetzen (Vorlauf)		
Comments			

Options	Effect
#VAR	Variable orientation with possible reduction of velocity and acceleration
#CONSTANT	Constant orientation
#JOINT	Variable orientation without reduction of velocity and acceleration

$ORI_TYPE_C

Orientation control for CP instructions (LIN, CIRC) in the main run

Data type	Enum	Value min.	
Unit		Value max.	
In file	---		
Original line	DECL ORI_TYPE $ORI_TYPE_C ;Orientierungsfuehrung bei CP-Saetzen (Hauptlauf)		
Comments			

Options	Effect
#VAR	Variable orientation with possible reduction of velocity and acceleration
#CONSTANT	Constant orientation
#JOINT	Variable orientation without reduction of velocity and acceleration

$OUT[n] Outputs

Data type	Boolean	Value	min.	1
Unit			max.	4096
In file	---			
Original line	BOOL $OUT[4096] ;Ausgang [1 bis 4096])*			
Comments	[n] = [1] ... [4096])* 1024, 2048 or 4096 outputs can be set by setting the variable “$SET_IO_SIZE” accordingly.			

$OUT_C[n] Outputs

Data type	Boolean	Value	min.	1
Unit			max.	4096
In file	---			
Original line	BOOL $OUT_C[4096] ;Ausgang [1 bis 4096])*			
Comments	[n] = [1] ... [4096] For setting outputs at the end point for motions with exact positioning and at the vertex for approximate positioning motions.)* 1024, 2048 or 4096 outputs can be set by setting the variable “$SET_IO_SIZE” accordingly.			

$OV_ASYNC Override for asynchronous external axes

Data type	Integer	Value	min.	0
Unit	%		max.	100
In file	---			
Original line	INT $OV_ASYNC ;OVERRIDE asynchrone Zusatzachsen			
Comments				

$OV_JOG

Jog override

Data type	Integer	Value	min.	0
Unit	%		max.	100
In file	---			
Original line	INT $OV_JOG ;Einricht-OVERRIDE			
Comments				

$OV_PRO

Program override

Data type	Integer	Value	min.	0
Unit	%		max.	100
In file	---			
Original line	INT $OV_PRO			
Comments				

$OV_PRO1

Internal use in the controller

Data type	Integer	Value	min.	
Unit			max.	
In file	---			
Original line	INT $OV_PRO1			
Comments				

$OV_ROB

Robot override

Data type	Integer	Value	min.	
Unit	%		max.	
In file	---			
Original line	INT $OV_ROB			
Comments				

$OV_ROB1

Internal use in the controller

Data type	Integer	Value	min.	
Unit			max.	
In file	---			
Original line	INT $OV_ROB1			
Comments				

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$PAL_MODE — Activate palletizing mode

Data type	Boolean	Value	min.	
Unit			max.	
In file	---			
Original line	BOOL $PAL_MODE ;Achse A4 wird auf null Grad fixiert			
Comments	Axis 4 is fixed at 0°. $PAL_MODE = $DEF_A4FIX is set during loading and program reset. Palletizing mode is automatically activated for a 5-axis robot and not for a normal 6-axis robot.			

Options	Effect
TRUE	Palletizing mode on
FALSE	Palletizing mode off

$PERI_RDY — Signal declaration “Drives ON”

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	Steu\Mada\$machine.dat			
Original line	SIGNAL $PERI_RDY $OUT[1012]			
Comments				

$PHGBRIGHT — Set display brightness

Data type	Integer	Value	min.	0
Unit			max.	15
In file	---			
Original line	INT $PHGBRIGHT			
Comments	The value set is lost if the robot controller is switched off			

Options	Effect
0	Display is dark
15	Display is bright

$PHGCONT — Set display contrast

Data type	Integer	Value	min.	0
Unit			max.	15
In file	---			
Original line	INT $PHGCONT			
Comments	The value set is lost if the robot controller is switched off			

Options	Effect
0	Lower contrast, dark
15	Higher contrast, bright

$PHGINFO — Serial number of the KCP CPU and software version

Data type	Character	Value	min.	
Unit			max.	
In file	---			
Original line	CHAR $PHGINFO[24]			
Comments				

$PHGTEMP — Current temperature inside the KCP

Data type	Integer	Value	min.	
Unit	°C		max.	
In file	---			
Original line	INT $PHGTEMP			
Comments				

$PMCHANNEL[n] — Assignment of the axes to the drive interfaces in the power module

Data type	Integer	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	INT $PMCHANNEL[n] ;Antriebsschnittstellen-Nr. auf dem Powermodul			
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6			

$POS_ACT

Current robot position, Cartesian

Data type	Structure	Value min.	
Unit	mm, °	Value max.	
In file	---		
Original line	E6POS $POS_ACT ;Aktuelle Roboterposition kartesisch [mm,Grad]		
Comments			

$POS_ACT.A

Rotation about the Z axis

Data type	Real	Value min.	
Unit	mm, °	Value max.	

$POS_ACT.B

Rotation about the Y axis

$POS_ACT.C

Rotation about the X axis

$POS_ACT.X

Offset in the X direction

$POS_ACT.Y

Offset in the Y direction

$POS_ACT.Z

Offset in the Z direction

$POS_ACT_MES

Measured actual position, Cartesian

Data type	Structure	Value min.	
Unit		Value max.	
In file	---		
Original line	E6POS $POS_ACT_MES		
Comments			

$POS_BACK

Start position of the current motion block, Cartesian

Data type	Structure	Value	min.	
Unit	mm, °		max.	
In file	---			
Original line	E6POS $POS_BACK ;Anfangsposition des aktuellen Bewegungssatzes kartesisch [mm,Grad]			
Comments				

$POS_BACK.A

Rotation about the Z axis

Data type	Real	Value	min.	
Unit	°		max.	

$POS_BACK.B

Rotation about the Y axis

$POS_BACK.C

Rotation about the X axis

$POS_BACK.X

Offset in the X direction

Data type	Real	Value	min.	
Unit	mm		max.	

$POS_BACK.Y

Offset in the Y direction

$POS_BACK.Z

Offset in the Z direction

$POS_FOR

Target position of the current motion block, Cartesian

Data type	Structure	Value min.	
Unit	mm, °	Value max.	
In file	---		
Original line	E6POS $POS_FOR ;Zielposition des aktuellen Bewegungssatzes kartesisch [mm,Grad]		
Comments			

$POS_FOR.A

Rotation about the Z axis

Data type	Real	Value min.	
Unit	°	Value max.	

$POS_FOR.B

Rotation about the Y axis

$POS_FOR.C

Rotation about the X axis

$POS_FOR.X

Offset in the X direction

$POS_FOR.Y

Offset in the Y direction

$POS_FOR.Z

Offset in the Z direction

$POS_INT

Position when interrupt is triggered, Cartesian

Data type	Structure	Value	min.	
Unit	mm, °		max.	
In file	---			
Original line	E6POS $POS_INT ;Unterbrechungsposition kartesisch [mm,Grad]			
Comments				

$POS_INT.A

Rotation about the Z axis

Data type	Real	Value	min.	
Unit	°		max.	

$POS_INT.B

Rotation about the Y axis

$POS_INT.C

Rotation about the X axis

$POS_INT.X

Offset in the X direction

Data type	Real	Value	min.	
Unit	mm		max.	

$POS_INT.Y

Offset in the Y direction

$POS_INT.Z

Offset in the Z direction

$POS_RET

Position when leaving the path, Cartesian

Data type	Structure	Value	min.	
Unit	mm, °		max.	
In file	---			
Original line	E6POS $POS_RET ;Rückpositionieren kartesisch [mm,Grad]			
Comments				

$POS_RET.A

Rotation about the Z axis

Data type	Real	Value	min.	
Unit	°		max.	

$POS_RET.B

Rotation about the Y axis

$POS_RET.C

Rotation about the X axis

$POS_RET.X

Offset in the X direction

Data type	Real	Value	min.	
Unit	mm		max.	

$POS_RET.Y

Offset in the Y direction

$POS_RET.Z

Offset in the Z direction

$POWER_FAIL

Display of power failure

Data type	Boolean	Value	min.	
Unit			max.	
In file	---			
Original line	BOOL $POWER_FAIL			
Comments				

Options	Effect
TRUE	Power failure
FALSE	No power failure

$POWERMODUL1
...
$POWERMODUL4

Internal register of power module 1 ... 4 for diagnostic purposes

Data type	Structure	Value min.	
Unit		max.	
In file	---		
Original line	DECL POWERMODUL $POWERMODUL1 ... DECL POWERMODUL $POWERMODUL4		
Comments			

$POWERMODUL1.BUSVOLTAGE
...
$POWERMODUL4.BUSVOLTAGE

Intermediate circuit voltage, power module 1 ... 4

Data type	Integer	Value min.	
Unit		max.	

$POWERMODUL1.CURRCAL
...
$POWERMODUL4.CURRCAL

Current calibration, power module 1 ... 4

$POWERMODUL1.CURRERROR
...
$POWERMODUL4.CURRERROR

Current error, power module 1 ... 4

$POWERMODUL1.PMERROR
...
$POWERMODUL4.PMERROR

Register for error messages, power module 1 ... 4

$POWERMODUL1.PMSTATE
...
$POWERMODUL4.PMSTATE

State of power module 1 ... 4

$POWEROFF_DELAYTIME Wait time before shutting down the system

Data type	Real	Value	min.	0
Unit	s		max.	30000
In file	---			
Original line	INT $POWEROFF_DELAYTIME			
Comments				

Options	Effect
0	The controller is shut down despite external power supply.
1...30000	Wait time in seconds before the system is shut down.

NOTE

On controllers of type KR C3A, KR C3E or COBRA, the variable $POWEROFF_DELAYTIME may be set to no more than 180 s. Otherwise, there is a risk of data loss.

$PR_MODE Signal declaration “Test mode”

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	Steu\Mada\$machine.dat			
Original line	SIGNAL $PR_MODE $OUT[998]			
Comments				

$PRO_ACT Signal declaration “Program status”

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	SIGNAL $PRO_ACT $OUT[1021]			
Comments				

Options	Effect
TRUE	Process is active.
FALSE	Process is not active.

$PRO_I_O

External program for controller node

Data type	Character	Value min.	
Unit		Value max.	
In file	Steu\Mada\$custom.dat		
Original line	CHAR $PRO_I_O[64]		
Comments	Determines which external program is automatically started for the controller node after download.		

$PRO_IP

Process pointer to current KRL process

Data type	Structure	Value min.	
Unit		Value max.	
In file	---		
Original line	DECL PRO_IP $PRO_IP		
Comments	Name = block name in advance run and main run SNR = block number in advance run and main run		

$PRO_IP.I_EXECUTED

KRL instruction executed

Data type	Boolean	Value min.	
Unit		Value max.	

Options	Effect
TRUE	KRL instruction executed
FALSE	KRL instruction not executed

$PRO_IP.NAME[32]

Name of the block in the advance run

Data type	Character	Value min.	
Unit		Value max.	

$PRO_IP.NAME_C[32]

Name of the block in the main run

$PRO_IP.P_ARRIVED

Path status for the programmed point

Data type	Integer	Value min.	
Unit		Value max.	

$PRO_IP.P_NAME[24]

Name or aggregate of the end or auxiliary point

Data type	Character	Value min.	
Unit		Value max.	

$PRO_IP.SNR

Block number in the advance run

Data type	Integer	Value min.	
Unit		Value max.	

$PRO_IP.SNR_C

Block number in the main run

$PRO_MODE

Program run mode dependent on “$INTERPRETER”

Data type	Enum	Value min.	
Unit		Value max.	
In file	---		
Original line	DECL PRO_MODE $PRO_MODE		
Comments	Program run modes: ISTEP, PSTEP, MSTEP, CSTEP, GO, BSTEP		

Options	Effect	
#ISTEP	Incremental Step:	Block-by-block processing with a stop after each instruction (without advance run processing).
#PSTEP	Program Step:	Complete processing of subprograms (without advance run processing).
#MSTEP	Motion Step:	Step-by-step processing with a stop after each motion instruction (without advance run processing).
#CSTEP	Continuous Step:	Step-by-step processing with a stop after each motion instruction (with advance run processing).
#GO		Continuous execution to the end of the program.
#BSTEP	Back Step:	Continuous execution backwards to the start of the program.

$PRO_MODE0

Process run mode of the Submit interpreter

Data type	Enum	Value min.	
Unit		max.	
In file	---		
Original line	DECL PRO_MODE $PRO_MODE0		
Comments	Internal use in the controller.		

Options	Effect
#ISTEP	
#PSTEP	
#MSTEP	
#CSTEP	
#GO	
#BSTEP	

$PRO_MODE1

Process run mode of the robot interpreter

Data type	Enum	Value min.	
Unit		max.	
In file	---		
Original line	DECL PRO_MODE $PRO_MODE1		
Comments	Internal use in the controller.		

Options	Effect
#ISTEP	
#PSTEP	
#MSTEP	
#CSTEP	
#GO	
#BSTEP	

$PRO_MOVE

Signal declaration “Motion status”

Data type	Signal declaration	Value min.	
Unit		max.	
In file	R1\Mada\$machine.dat		
Original line	SIGNAL $PRO_MOVE $OUT[1022] ;Programmbewegung aktiv		
Comments			

$PRO_NAME[24] — Process name dependent on “$INTERPRETER”

Data type	Character	Value min.	
Unit		Value max.	
In file	---		
Original line	CHAR $PRO_NAME[24]		
Comments			

$PRO_NAME0[24] — Process name of the Submit interpreter

Data type	Character	Value min.	
Unit		Value max.	
In file	---		
Original line	CHAR $PRO_NAME0[24]		
Comments	Internal use in the controller.		

$PRO_NAME1[24] — Process name of the robot interpreter

Data type	Character	Value min.	
Unit		Value max.	
In file	---		
Original line	CHAR $PRO_NAME1[24]		
Comments	Internal use in the controller.		

$PRO_START — START program execution / command

Data type	Boolean	Value min.	
Unit		Value max.	
In file	---		
Original line	BOOL $PRO_START ;Start wirkt auf Programm		
Comments			

Options	Effect
TRUE	Program execution
FALSE	Command execution

$PRO_STATE

Process state dependent on “$INTERPRETER”

Data type	Enum	Value	min.	
Unit			max.	
In file	---			
Original line	DECL PRO_STATE $PRO_STATE			
Comments				

Options	Effect
#P_FREE	Program not selected
#P_RESET	Program reset
#P_ACTIVE	Program active
#P_STOP	Program stopped
#P_END	End of program reached

$PRO_STATE0

Process state of the Submit interpreter

Data type	Enum	Value	min.	
Unit			max.	
In file	---			
Original line	DECL PRO_STATE $PRO_STATE0			
Comments	Internal use in the controller.			

$PRO_STATE1

Process state of the robot interpreter

Data type	Enum	Value	min.	
Unit			max.	
In file	---			
Original line	DECL PRO_STATE $PRO_STATE1			
Comments	Internal use in the controller.			

$PROG_EEPOT

Programming EE potentiometers of DSE – specification of axis numbers

Data type	Integer	Value	min.	1
Unit			max.	12
In file	---			
Original line	INT $PROG_EEPOT ;Programmierung der EEPOTIS DSE			
Comments	The EE potentiometers on the power module are programmed here; this requires entry of the axis numbers.			

$PROG_TORQ_MON

Command torque monitoring

Data type	Boolean	Value	min.	
Unit			max.	
In file	R1\Mada\$robcor.dat			
Original line	BOOL $PROG_TORQ_MON=FALSE ;Ueberwachung der Soll-Momente Motor und Getriebe			
Comments	If the operating mode is changed while the message is activated (TRUE), the following acknowledgeable message is generated: 1467 Attention! Maximum speed could be programmed.			

Options	Effect
TRUE	Command torque monitoring activated
FALSE	Command torque monitoring deactivated

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$RAISE_T_MOT[n] — Motor run-up time without the axis being loaded, axes 1 ... 12

Data type	Real	Value min.	
Unit	ms	Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $RAISE_T_MOT[n]		
Comments	Time in which the motor accelerates to rated speed without the axis being loaded. [n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6		

$RAISE_TIME[n] — Axis run-up time, axes 1 ... 12

Data type	Real	Value min.	
Unit	ms	Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $RAISE_TIME[n]		
Comments	Time in which the axis can be accelerated to rated speed. [n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6		

$RAT_MOT_AX[n] — Motor:axis transmission ratio, axes 1 ... 12

Data type	Integer	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	DECL FRA $RAT_MOT_AX[n] ;Uebersetzung Motor-Achse N = Zaehler, D = Nenner		
Comments	Format: N Motor, D Axis [n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6		

$RAT_MOT_ENC[n] — Motor:encoder transmission ratio of axes 1 ... 12

Data type	Integer	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	DECL FRA $RAT_MOT_ENC[n] ;Uebersetzung Motor-Geber N = Zaehler, D = Nenner		
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6		

$RC_RDY1 — Signal declaration “Ready for Program Start”

Data type	Signal declaration	Value min.	
Unit		Value max.	
In file	Steu\Mada\$machine.dat		
Original line	SIGNAL $RC_RDY1 $OUT[1014] ;RC-Betriebsbereit 1		
Comments			

$RCV_INFO — Version of the kernel system

Data type	Character	Value min.	
Unit		Value max.	
In file	---		
Original line	CHAR $RCV_INFO[128]		
Comments	String which designates the version of the kernel system. Example: “KS V5.46 (krc1adm@ks_build_01) #1 Tue Aug 13 12:59:31 WS 2002 RELEASE” Meaning: Kernel system version V5.46, compiled by KRC1ADM on the ks_build_01 computer on 13 August 2002 at 12:59 PM.		

$REBOOTDSE

Flag for re-initializing the digital servoelectronics (DSE)

Data type	Boolean	Value min.	
Unit		max.	
In file	---		
Original line	BOOL $REBOOTDSE		
Comments	For software development only!		

Options	Effect
TRUE	DSE is re-initialized

$RED_ACC_AXC[n]

Reduction factor for axial acceleration in axis-specific jogging and command mode, axes 1 ... 12

Data type	Integer	Value min.	
Unit	%	max.	
In file	R1\Mada\$machine.dat		
Original line	INT $RED_ACC_AXC[n]		
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6		

$RED_ACC_CPC

Reduction factor for CP and orientation acceleration in Cartesian jogging and command mode

Data type	Integer	Value min.	
Unit	%	max.	
In file	R1\Mada\$machine.dat		
Original line	INT $RED_ACC_CPC		
Comments			

$RED_ACC_DYN

Reduction factor for acceleration

Data type	Integer	Value min.	
Unit		max.	
In file	R1\Mada\$machine.dat		
Original line	INT $RED_ACC_DYN		
Comments			

$RED_ACC_EMX

Reduction factor for path-maintaining EMERGENCY STOP ramp

Data type	Integer	Value min.	
Unit	%	max.	
In file	R1\Mada\$machine.dat		
Original line	INT $RED_ACC_EMX[12]		
Comments			

$RED_ACC_OV[n]

Reduction of acceleration for override changes, axes 1 ... 12

Data type	Integer	Value min.	
Unit	%	max.	
In file	R1\Mada\$machine.dat		
Original line	INT $RED_ACC_OV[n]		
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6		

$RED_CAL_SD

Reduction factor for velocity in referencing after reaching reference point cam

Data type	Integer	Value min.	
Unit	%	max.	
In file	R1\Mada\$machine.dat		
Original line	INT $RED_CAL_SD		
Comments	Only required with incremental encoders		

$RED_CAL_SF

Reduction factor for velocity in referencing before reaching reference point cam

Data type	Integer	Value min.	
Unit	%	max.	
In file	R1\Mada\$machine.dat		
Original line	INT $RED_CAL_SF		
Comments			

$RED_JUS_UEB

Reduction factor for sensor location run

Data type	Real	Value	min.	
Unit	%		max.	
In file	R1\Mada\$machine.dat			
Original line	REAL $RED_JUS_UEB			
Comments				

$RED_T1

Reduction factor for T1 mode

Data type	Integer	Value	min.	
Unit	%		max.	
In file	R1\Mada\$machine.dat			
Original line	INT $RED_T1			
Comments				

$RED_T1_OV_CP

Type of reduction of CP velocity for CP motions in T1 mode

Data type	Boolean	Value	min.	
Unit			max.	
In file	Steu\Mada\$custom.dat			
Original line	BOOL $RED_T1_OV_CP=TRUE			
Comments				

Options	Effect
TRUE	The CP velocity is reduced by the percentage value set in $RED_T1.
FALSE	The CP velocity is reduced to the value set in $VEL_CP_T1.

$RED_VEL

Reduction factor for program in the advance run

Data type	Integer	Value	min.	1
Unit	%		max.	100
In file	---			
Original line	INT $RED_VEL			
Comments				

$RED_VEL_AXC[n]

Reduction factor for axial velocity in axis-specific jogging and command mode (PTP)

Data type	Integer	Value	min.	
Unit	%		max.	
In file	R1\Mada\$machine.dat			
Original line	INT $RED_VEL_AXC[n]			
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6			

$RED_VEL_C

Reduction factor for program in the main run

Data type	Integer	Value	min.	1
Unit	%		max.	100
In file	R1\Mada\$machine.dat			
Original line	INT $RED_VEL_C			
Comments				

$RED_VEL_CPC

Reduction factor for CP, swivel and rotational velocity in Cartesian jogging and command mode (CP)

Data type	Integer	Value	min.	
Unit	%		max.	
In file	R1\Mada\$machine.dat			
Original line	INT $RED_VEL_CPC			
Comments				

$REVO_NUM[n]

Revolution counter for endless axes

Data type	Integer	Value	min.	
Unit			max.	
In file	---			
Original line	INT $REVO_NUM[n]			
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6			

$RINT_LIST — List of interrupts at robot level

Data type	Integer	Value	min.	
Unit			max.	
In file	---			
Original line	DECL INT_INFO $RINT_LIST[32]			
Comments	This information is shown in the menu “Monitor – Diagnosis – Interrupts”.			

$ROB_CAL — Signal declaration “Referencing status”

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	SIGNAL $ROB_CAL $OUT[1001] ;Roboter synchron			
Comments				

$ROB_STOPPED — Signal declaration “Motion monitoring”

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	SIGNAL $ROB_STOPPED $OUT[1023] ;Roboter steht			
Comments				

$ROB_TIMER — Clock generator

Data type	Integer	Value	min.	
Unit			max.	
In file	---			
Original line	INT $ROB_TIMER			
Comments	Serves as a clock generator if no exact time measurement is required			

$ROBROOT

Position of robot in world coordinate system

Data type	Structure	Value min.	
Unit	mm, °	Value max.	
In file	---		
Original line	FRAME $ROBROOT={x 0.0,y 0.0,z 0.0,a 0.0,b 0.0,c 0.0} ;Roboter im Weltkoordinatensystem [mm,Grad]		
Comments			

$ROBROOT_C

Position of robot root point in world coordinate system in the main run

Data type	Structure	Value min.	
Unit		Value max.	
In file	---		
Original line	FRAME $ROBROOT_C ;Roboterfusspunkt im Weltkoordinatensystem Hauptlauf		
Comments			

$ROBROOT_KIN

Name of the external Robroot kinematic system

Data type	Character	Value min.	
Unit		Value max.	
In file	---		
Original line	CHAR $ROBROOT_KIN[29] ;Externe Kinematikachsen in ROBROOT		
Comments			

$ROBRUNTIME

Operating hours meter

Data type	Integer	Value min.	
Unit	min	Value max.	
In file	---		
Original line	INT $ROBRUNTIME		
Comments			

$ROBTRAFO

Robot name

Data type	Character	Value min.	
Unit		max.	
In file	---		
Original line	CHAR $ROBTRAFO[32]		
Comments			

$ROTSYS

Rotational reference system for relative blocks in the advance run

Data type	Structure	Value min.	
Unit		max.	
In file	---		
Original line	DECL ROTSYS $ROTSYS		
Comments			

Options	Effect
#AS_TRA	
#TCP	
#BASE	

$ROTSYS_C

Rotational reference system for relative blocks in the main run

Data type	Structure	Value min.	
Unit		max.	
In file	---		
Original line	DECL ROTSYS $ROTSYS_C		
Comments			

Options	Effect
#AS_TRA	
#TCP	
#BASE	

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$SAFEGATE_OP

Activate path-maintaining braking in event of operator safety violation

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	Steu\Mada\$machine.dat			
Original line	SIGNAL $SAFEGATE_OP $IN[1025]			
Comments				

$SAFETY_SW

Status of enabling switch (valid KSS 6.0 onwards)

Data type	Enum	Value	min.	
Unit			max.	
In file				
Original line	DECL SIG_STATE $SAFETY_SW			
Comments				

Options	Effect
#RELEASED	No enabling switch pressed (default position) or switched fully pressed (panic position).
#PRESSED	One or more enabling switches pressed (enabling position).

$SEN_DEL[n]

Distance traveled during signal propagation time in EMT

Data type	Integer	Value	min.	
Unit	Incr		max.	
In file	R1\Mada\$machine.dat			
Original line	INT $SEN_DEL[n]			
Comments	Distance traveled during signal propagation time in EMT in increments due to the time delay between passing the mastering notch and generation of the signal. [n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6			

$SEN_PINT[1]...[20]

Exchange of integer values in advance run between the controller and the sensor interface program

Data type	Integer	Value	min.	
Unit			max.	
In file	---			
Original line	INT $SEN_PINT[20]			
Comments				

$SEN_PINT_C[1]...[20]

Exchange of integer values in main run between the controller and the sensor interface program

Data type	Integer	Value	min.	
Unit			max.	
In file	---			
Original line	INT $SEN_PINT_C[20]			
Comments				

$SEN_PREA[1]...[20]

Exchange of real values in advance run between the controller and the sensor interface program

Data type	Real	Value	min.	
Unit			max.	
In file	---			
Original line	REAL $SEN_PREA[20]			
Comments				

$SEN_PREA_C[1]...[20]

Exchange of real values in main run between the controller and the sensor interface program

Data type	Real	Value	min.	
Unit			max.	
In file	---			
Original line	REAL $SEN_PREA_C[20]			
Comments				

$SEQ_CAL

Referencing sequence of the axes

Data type	Integer	Value min.	
Unit	Bit sequence	Value max.	
In file	R1\Mada\$machine.dat		
Original line	INT $SEQ_CAL[12]		
Comments			

Options	Effect
LSB	Axis 1
MSB	Axis 12

$SERV_OFF_TM[n]

Time during which axis servo and axis brake overlap in order to locate the axis securely

Data type	Integer	Value min.	
Unit	ms	Value max.	
In file	R1\Mada\$machine.dat		
Original line	INT $SERV_OFF_TM[n] ;Reglersperrzeit Achse[n]		
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6		

$SERVOFILE ... $SERVOFILE12

Servo parameters 1 ... 12 for DSE when the controller is booted

Data type	Character	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	CHAR $SERVOFILE1[16] ... CHAR $SERVOFILE12[16]		
Comments	When the controller is booted, servo parameters for each axis can be sent to the DSE. These parameters must be available in a file “Filename” in the directory R1\Mada. The name of this file must be entered in the robot-specific machine data, for example: $SERVOFILE1[]= “dumper.servo”. “DEFAULT” is not permissible as a parameter file name.		

$SERVOPARA

Online modification of servo parameters

Data type	Structure	Value min.	
Unit		max.	
In file	---		
Original line	DECL SERVOPARA $SERVOPARA		
Comments			

$SET_IO_SIZE

Defines the maximum number of inputs/outputs that may be used

Data type	Integer	Value min.	
Unit		max.	
In file	---		
Original line	INT $SET_IO_SIZE		
Comments	If the default 1024 inputs/outputs are not sufficient, the number of usable I/Os can be increased to 2048 or 4096 by setting the variable “$SET_IO_SIZE” accordingly.		

Options	Effect
1	1024 inputs/outputs as standard
2	2048 inputs/outputs
4	4096 inputs/outputs

$SIMULATE

Simulate observer’s point of view using the 6D mouse (AnySim)

Data type	Boolean	Value min.	
Unit		max.	
In file	---		
Original line	BOOL $SIMULATE		
Comments	For offline programming with AnySim it is possible to change the observer’s point of view using the 6D mouse. To do so, the system variable $SIMULATE must be set. The mouse data are then no longer processed in the kernel system, but sent to Cross via the socket interface.		

Options	Effect
TRUE	Simulation active
FALSE	Simulation not active

$SINGUL_ERR_JOG

Maximum orientation error for singularity-free motion in jog mode

Data type	Structure	Value	min.	
Unit			max.	
In file	Steu\Mada\$custom.dat			
Original line	FRAME $SINGUL_ERR_JOG={a 5.0,b 5.0,c 5.0}			
Comments				

$SINGUL_ERR_PRO

Maximum orientation error for singularity-free motion in automatic mode

Data type	Structure	Value	min.	
Unit			max.	
In file	Steu\Mada\$custom.dat			
Original line	FRAME $SINGUL_ERR_PRO={a 0.0,b 0.0,c 0.0}			
Comments				

$SINGUL_POS[1]

Response of axis 1 in the event of an overhead singularity (α1 position)

Data type	Integer	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	$SINGUL_POS[1]			
Comments	Treatment of an undefined joint position			

Options	Effect
0	The angle for axis 1 is defined as “0” degrees
1	The angle for axis 1 remains the same from the start point to the end point

$SINGUL_POS[2]

Response of axis 2 in the event of an extended position singularity (α2 position)

Data type	Integer	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	$SINGUL_POS[2]		
Comments	Treatment of an undefined joint position		

Options	Effect
0	The angle for axis 2 is defined as “0” degrees
1	The angle for axis 2 remains the same from the start point to the end point

$SINGUL_POS[3]

Response of axis 4 in the event of a wrist axis singularity (α5 position)

Data type	Integer	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	$SINGUL_POS[3]		
Comments	Treatment of an undefined joint position		

Options	Effect
0	The angle for axis 4 is defined as “0” degrees
1	The angle for axis 4 remains the same from the start point to the end point

$SINGUL_STRATEGY

Strategy for singularity-free motion

Data type	Integer	Value min.	
Unit		Value max.	
In file	---		
Original line	INT $SINGUL_STRATEGY		
Comments			

Options	Effect
0	No strategy
1	Approximation strategy: moving through the singularity by means of changes in orientation

$SINT_LIST

List of interrupts at Submit level

Data type	Structure	Value min.	
Unit		Value max.	
In file	---		
Original line	DECL INT_INFO $SINT_LIST[32]		
Comments	This information is shown in the menu Monitor → Diagnosis → Interrupts.		

$SLAVE_AXIS_INC

Actual position of master/slave axes in increments

Data type	Integer	Value min.	
Unit		Value max.	
In file	---		
Original line	DECL SLAVE_AXIS_INC $SLAVE_AXIS_INC[12]		
Comments	M: Master S1 - S5: Slaves e.g.: $SLAVE_AXIS_INC[6].S2 --> 2nd slave of axis 6 $SLAVE_AXIS_INC[1].M --> master of axis 1		

$SOFTN_END[n]

Position of the software limit switches at the negative end of the axis (axes 1 ... 12)

Data type	Real	Value min.	
Unit	mm, °	Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $SOFTN_END[n]		
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6		

$SOFTP_END[n]

Position of the software limit switches at the positive end of the axis (axes 1 ... 12)

Data type	Real	Value min.	
Unit	mm, °	Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $SOFTP_END[n]		
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6		

$SOFTPLCBOOL[n] Data exchange between KRC and SoftPLC

Data type	Boolean	Value min.	
Unit		max.	
In file	---		
Original line	BOOL $SOFTPLCBOOL[n]		

Comments	[n] = [1] ... [1024]
	Read value:
	single: T_INT16 RdPLC_BOOL(T_UINT16 Index, T_FLAG * Erg);
	several: T_INT16 RdPLC_BOOL_EX(T_FLAG * pBoolArray, T_UINT16 nIndex, T_UINT16 nAmount);
	Write value:
	single: T_INT16 WrPLC_BOOL(T_UINT16 Index, T_FLAG Wert);
	several: T_INT16 WrPLC_BOOL_EX(T_FLAG * pBoolArray, T_UINT16 nIndex, T_UINT16 nAmount);
	nIndex: Defined position beyond which data are read
	nAmount: Number of variables used
	The return value sent is either “0” (reading/writing OK) or “–1” (error reading or writing).		

Options	Effect
TRUE	None, because user variable
FALSE	None, because user variable

$SOFTPLCINT[n] Data exchange between KRC and SoftPLC

Data type	Integer	Value min.	
Unit		max.	
In file	---		
Original line	INT $SOFTPLCINT[n]		

Comments	[n] = [1] ... [1024]
	Read value:
	single: T_INT16 RdPLC_INT(T_UINT16 Index, T_INT32 * Erg);
	several: T_INT16 RdPLC_INT_EX(T_INT32* pIntArray, T_UINT16 nIndex, T_UINT16 nAmount);
	Write value:
	single: T_INT16 WrPLC_INT(T_UINT16 Index, T_INT32 Wert);
	several: T_INT16 WrPLC_INT_EX(T_INT32* pIntArray, T_UINT16 nIndex, T_UINT16 nAmount);
	nIndex: Defined position beyond which data are read
	nAmount: Number of variables used
	The return value sent is either “0” (reading/writing OK) or “–1” (error reading or writing).		

Options	Effect
TRUE	None, because user variable
FALSE	None, because user variable

$SOFTPLCREAL[n] — Data exchange between KRC and SoftPLC

Data type	Real	Value min.	
Unit		Value max.	
In file	---		
Original line	REAL $SOFTPLCREAL[n]		

Comments	[n] = [1] ... [1024]
	Read value:
	single: T_INT16 RdPLC_REAL(T_UINT16 Index, T_FLOAT * Erg);
	several: T_INT16 RdPLC_REAL_EX(T_FLOAT* pFloatArray, T_UINT16 nIndex, T_UINT16 nAmount);
	Write value:
	single: T_INT16 WrPLC_INT(T_UINT16 Index, T_FLOAT Wert);
	several: T_INT16 WrPLC_REAL_EX(T_FLOAT* pRealArray, T_UINT16 nIndex, T_UINT16 nAmount);
	nIndex: Defined position beyond which data are read
	nAmount: Number of variables used
	The return value sent is either “0” (reading/writing OK) or “-1” (error reading or writing).		

Options	Effect
TRUE	None, because user variable
FALSE	None, because user variable

$SPC_KIN — Data for special kinematics

Data type	Real	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $SPC_KIN[30] ;Sonderkinematiken		
Comments			

$SPIN_A

Description of the spindle drive

Data type	Structure	Value min.	
Unit		max.	
In file	R1\Mada\$machine.dat		
Original line	DECL SPIN $SPIN_A={SPIN_AXIS 0,SPIN_RAD_G 0.0, SPIN_RAD_H 0.0,SPIN_SG 0,SPIN_BETA 0.0}		
Comments			

$SPIN_A.SPIN_AXIS

Number of the axis on which the spindle acts

Data type	Integer	Value min.	
Unit		max.	

$SPIN_A.SPIN_BETA

Offset of the angle between sides “g” and “h” of the trapezoid in relation to initial angle

Data type	Real	Value min.	
Unit		max.	

$SPIN_A.SPIN_RAD_G

Length of the static side “g” of the spindle

$SPIN_A.SPIN_RAD_H

Length of the moving side “h” of the spindle

$SPIN_A.SPIN_SG

Sign for the direction of rotation

Data type	Integer	Value min.	
Unit		max.	

$SPIN_B

Description of the spindle drive

Data type	Structure	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	DECL SPIN $SPIN_B={SPIN_AXIS 0,SPIN_RAD_G 0.0, SPIN_RAD_H 0.0,SPIN_SG 0,SPIN_BETA 0.0}		
Comments			

$SPIN_B.SPIN_AXIS

Number of the axis on which the spindle acts

Data type	Integer	Value min.	
Unit		Value max.	

$SPIN_B.SPIN_BETA

Offset of the angle between sides “g” and “h” of the trapezoid in relation to initial angle

Data type	Real	Value min.	
Unit		Value max.	

$SPIN_B.SPIN_RAD_G

Length of the static side “g” of the spindle

$SPIN_B.SPIN_RAD_H

Length of the moving side “h” of the spindle

$SPIN_B.SPIN_SG

Sign for the direction of rotation

$SPIN_C

Description of the spindle drive

Data type	Structure	Value min.	
Unit		max.	
In file	R1\Mada\$machine.dat		
Original line	DECL SPIN $SPIN_C={SPIN_AXIS 0,SPIN_RAD_G 0.0, SPIN_RAD_H 0.0,SPIN_SG 0,SPIN_BETA 0.0}		
Comments			

$SPIN_C.SPIN_AXIS

Number of the axis on which the spindle acts

Data type	Integer	Value min.	
Unit		max.	

$SPIN_C.SPIN_BETA

Offset of the angle between sides “g” and “h” of the trapezoid in relation to initial angle

Data type	Real	Value min.	
Unit		max.	

$SPIN_C.SPIN_RAD_G

Length of the static side “g” of the spindle

$SPIN_C.SPIN_RAD_H

Length of the moving side “h” of the spindle

$SPIN_C.SPIN_SG

Sign for the direction of rotation

Data type	Integer	Value min.	
Unit		max.	

$SPINDLE

Spindles

Data type	Integer	Value min.	
Unit		max.	
In file	R1\Mada\$machine.dat		
Original line	INT $SPINDLE		
Comments			

Options	Effect
0	No
1	Yes

$SS_MODE — Signal declaration “Single step mode”

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	Steu\Mada\$machine.dat			
Original line	SIGNAL $SS_MODE $OUT[999]			
Comments				

$ST_TOL_TIME — Standstill detection time

Data type	Integer	Value	min.	
Unit	ms		max.	
In file	R1\Mada\$machine.dat			
Original line	INT $ST_TOL_TIME			
Comments	Time in ms that the robot must remain in velocity band $ST_TOL_VEL before a standstill will be detected.			

$ST_TOL_VEL[n] — Velocity limit for standstill detection

Data type	Real	Value	min.	
Unit	1/min		max.	
In file	R1\Mada\$machine.dat			
Original line	REAL $ST_TOL_VEL[n]			
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6			

$STOPMB_ID — Identification of the mailbox for stop messages

Data type	Integer	Value	min.	
Unit			max.	
In file	---			
Original line	INT $STOPMB_ID			
Comments				

$STOPMESS

Signal declaration “Stop message”

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	Steu\Mada\$machine.dat			
Original line	SIGNAL $STOPMESS $OUT[1010]			
Comments				

Options	Effect
TRUE	Stop message; the assigned output is set to TRUE.
FALSE	No stop message; the assigned output is set to FALSE.

$STOPNOAPROX

Message “Approximation not possible”, with or without acknowledgement

Data type	Boolean	Value	min.	
Unit			max.	
In file	---			
Original line	BOOL $STOPNOAPROX			
Comments	Defines whether in the event of “Approximation not possible” a notification message or an acknowledgment message is generated.			

Options	Effect	
TRUE	T1/T2 mode:	Acknowledgement message “Approximation not possible”. The robot stops.
	AUT/EXT mode:	Notification message “Approximation not possible”.
FALSE	T1/T2 mode:	Notification message “Approximation not possible”.
	AUT/EXT mode:	No message.

$STROBE1 ... $STROBE6

Measured-value scan, strobe for digital input 1 ... 6

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	Steu\Mada\$machine.dat			
Original line	SIGNAL $STROBE1 $OUT[1015] ... SIGNAL $STROBE6 $OUT[1020]			
Comments	Strobe output for digital input 1 ... 6			

$STROBE1LEV ... $STROBE6LEV

Strobe pulse digital input 1 ... 6 High or Low

Data type	Boolean	Value min.	
Unit		max.	
In file	Steu\Mada\$machine.dat		
Original line	BOOL $STROBE1LEV ... BOOL $STROBE6LEV		
Comments	Active flank of the strobe output for digital input 1 ... 6		

Options	Effect
TRUE	Strobe is a High pulse
FALSE	Strobe is a Low pulse

$SYNC

Generation of phase-synchronous profiles

Data type	Integer	Value min.	
Unit		max.	
In file	R1\Mada\$robcor.dat		
Original line	INT $SYNC ;Phasenanpassung (1 = synchron, 0 = nicht synchron)		
Comments	Generation of phase-synchronous profiles on/off. If acceleration adaptation is switched on and higher motion profile is deactivated, phase-synchronous profiles are generated for PTP individual blocks – if at the same time $SYNC > 0. This means that all acceleration, constant travel and deceleration phases take place simultaneously for all axes. Thus the geometric path does not change if the motion parameters are changed. This is not the case if $SYNC=0; in this case the axes merely start and end motion at the same time.		

Options	Effect
1	Profiles are phase-synchronous
0	Profiles are not phase-synchronous

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$T1

Signal declaration “TEST 1 mode” – “T1”

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	Steu\Mada\$machine.dat			
Original line	SIGNAL $T1 $OUT[993]			
Comments				

$T2

Signal declaration “TEST 2 mode” – “T2”

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	Steu\Mada\$machine.dat			
Original line	SIGNAL $T2 $OUT[994]			
Comments				

$T2_OUT_WARNING

Warning in the event of mode change to “T2” or “AUT”

Data type	Boolean	Value	min.	
Unit			max.	
In file	Steu\MaDa\$option.dat			
Original line	BOOL $T2_OUT_WARNING=FALSE			
Comments				

Options	Effect
TRUE	Warning activated
FALSE	Warning deactivated

$T2_OV_REDUCE

Reduction of the override when switching to “T2”

Data type	Boolean	Value min.	
Unit		max.	
In file	Steu\MaDa\$option.dat		
Original line	BOOL $T2_OV_REDUCE=FALSE		
Comments	When the operating mode is switched to “T2”, the override is automatically reduced to 10%. The “T1” override setting is saved and is available once again when the mode is switched back to “T1” (customer version 1). The default value for “T1” (e.g. after a cold reboot) is 100%.		

Options	Effect
TRUE	Override is reduced to 10% when switching to “T2” and the “T1” override setting is saved.
FALSE	Override is not reduced when switching to “T2”. The “T1” override setting is not saved.

$TARGET_STATUS

Selection of status for motion from start point to end (target) point

Data type	Enum	Value min.	
Unit		max.	
In file	Steu\MaDa\$custom.dat		
Original line	DECL TARGET_STATUS $TARGET_STATUS=#SOURCE		
Comments	Used by the KRL function INVERSE() if the transferred end (target) point does not have a valid STATUS value.		

Options	Effect
#SOURCE	Use Status of start point.
#BEST	All eight Status combinations are calculated; the one with the shortest path between the start point and end point in axis space is selected.

$TC_SYM

Time-constant symmetry filters

Data type	Real	Value min.	
Unit		max.	
In file	R1\Mada\$machine.dat		
Original line	REAL $TC_SYM		
Comments	The axes are made symmetrical by means of the machine datum “$TC_SYM”. For optimum CP motion, the value of the equivalent circuit constant of the slowest speed control loop should be entered here.		

$TCP_IPO

Flag for “TCP-related interpolation” mode

Data type	Boolean	Value min.	
Unit		max.	
In file	Steu\Mada\$option.dat		
Original line	BOOL $TCP_IPO=FALSE		
Comments			

Options	Effect
TRUE	“TCP-related interpolation” on
FALSE	“TCP-related interpolation” off

$TECH

Function parameters for function generator in the advance run

Data type	Enum	Value min.	
Unit		max.	
In file	R1\Mada\$operate.dat		
Original line	DECL TECH $TECH[6]		
Comments			

$TECH_ANA_FLT_OFF[n] — Deactivate analog output filter for Techval

Data type	Boolean	Value	min.	
Unit			max.	
In file	Steu\Mada\$custom.dat			
Original line	BOOL $TECH_ANA_FLT_OFF[n] ;Zykl. Analogausgabe des TECHVALS gefiltert			
Comments	[n] = [1] ... [6] The value of the system variable “$ANA_DEL_FLT” is ignored as soon as one of the variables “$TECH_ANA_FLT_OFF[1] ... [6]” also has the value “TRUE”. If you wish to use “$ANA_DEF_FLT”, the six variables “$ANA_DEF_FLT_OFF[1] ... [6]” and “$VEL_FLT_OFF” must be set to “FALSE”.			

Options	Effect
TRUE	The signal is not filtered so the programmed amplitude is reached exactly and without phase shift.
FALSE	The signal is output through a filter, as previously, so the analog signal does not quite reach the programmed amplitude and is dependent on the velocity and the override.

$TECH_C — Function parameters for function generator in the main run

Data type	Enum	Value	min.	
Unit			max.	
In file	---			
Original line	DECL TECH $TECH_C[6] ;Funktionsparameter Funktionsgenerator Hauptlauf			
Comments				

$TECH_FUNC — Functionality bits for the function generator

Data type	Integer	Value	min.	
Unit			max.	
In file	Steu\Mada\$custom.dat			
Original line	INT $TECH_FUNC=’B0000’			
Comments				

$TECH_MAX

Maximum number of function generators

Data type	Integer	Value min.	
Unit		max.	
In file	R1\Mada\$machine.dat		
Original line	INT $TECH_MAX ;Max. Anzahl Funktionsgeneratoren		
Comments			

$TECH_OPT

Option bit for the function generator

Data type	Boolean	Value min.	
Unit		max.	
In file	Steu\Mada\$option.dat		
Original line	BOOL $TECH_OPT=FALSE ;Funktionsgenerator		
Comments			

Options	Effect
TRUE	Function generator on.
FALSE	Function generator off.

$TECHANGLE

Rotation of the TTS in the advance run

Data type	Structure	Value min.	
Unit		max.	
In file	---		
Original line	DECL TECHANGLE $TECHANGLE ;Verdrehung Technologiedreibein im Vorlauf		
Comments			

$TECHANGLE_C

Rotation of the TTS in the main run

Data type	Structure	Value min.	
Unit		max.	
In file	---		
Original line	DECL TECHANGLE $TECHANGLE_C		
Comments			

$TECHIN

Input value for function generator

Data type	Real	Value min.	
Unit		max.	
In file	---		
Original line	REAL $TECHIN[6] ;Eingangswert Funktionsgenarator		
Comments			

$TECHPAR

Parameterization of the function generator in the advance run

Data type	Real	Value min.	
Unit		max.	
In file	---		
Original line	REAL $TECHPAR[6,10] ;Parameter Funktionsgenerator		
Comments			

$TECHPAR_C

Parameterization of the function generator in the main run

Data type	Real	Value min.	
Unit		max.	
In file	---		
Original line	REAL $TECHPAR_C[6,10] ;Parameter Funktionsgenerator		
Comments			

$TECHSYS

TTS in the advance run

Data type	Enum	Value min.	
Unit		max.	
In file	---		
Original line	DECL TECHSYS $TECHSYS ;Technologiedreibein im Vorlauf		
Comments			

$TECHSYS_C

TTS in the main run

Data type	Enum	Value	min.	
Unit			max.	
In file	---			
Original line	DECL TECHSYS $TECHSYS ;Technologiedreibein im Hauptlauf			
Comments				

$TECHVAL

Function value for function generator

Data type	Real	Value	min.	
Unit			max.	
In file	---			
Original line	REAL $TECHVAL[6] ;Funktionswert Funktionsgenerator			
Comments				

$TFLWP

Offset between flange point and wrist point coordinate system

Data type	Structure	Value	min.	
Unit	Frame		max.	
In file	R1\Mada\$machine.dat			
Original line	FRAME $TFLWP={x 0.0,y 0.0,z 210.0,a 0.0,b 0.0,c 0.0} ;Frame zwischen Flansch- und Handpunktkoordinatensystem			
Comments				

$TIME_POS[n]

Axis positioning time

Data type	Integer	Value	min.	
Unit	ms		max.	
In file	R1\Mada\$machine.dat			
Original line	INT $TIME_POS[n]			
Comments	Maximum time for positioning of the axis. [n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6			

$TIMER[n] — Timer

Data type	Integer	Value min.	
Unit	ms	Value max.	
In file	---		
Original line	INT $TIMER[n]		
Comments	[n] = [1] ... [32] Value of timer[n] increases by 1 each millisecond if $TIMER_STOP = FALSE.		

$TIMER_FLAG[n] — Display if timer greater than or equal to zero

Data type	Boolean	Value min.	
Unit		Value max.	
In file	---		
Original line	BOOL $TIMER_FLAG[n]		
Comments	[n] = [1] ... [36]		

Options	Effect
TRUE	Value for timer n is greater than zero.
FALSE	Value for timer n is equal to zero.

$TIMER_STOP[n] — Start and stop the timer

Data type	Boolean	Value min.	
Unit		Value max.	
In file	---		
Original line	BOOL $TIMER_STOP[n]		
Comments	[n]= [1] ... [32]		

Options	Effect
TRUE	Timer is stopped.
FALSE	Timer is started.

$TIRORO

Offset between internal and current robot coordinate systems

Data type	Structure	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	FRAME $TIRORO={x 0.0,y 0.0,z 865.0,a 0.0,b 0.0,c 0.0}			
Comments				

$TL_COM_VAL

Tolerance time after exceeding the command speed limitation

Data type	Integer	Value	min.	
Unit	ms		max.	
In file	R1\Mada\$machine.dat			
Original line	INT $TL_COM_VAL=50 ;Toleranzzeit Solldrehzahlbegrenzung [ms]			
Comments				

$TM_CON_VEL

Definition of minimum constant travel phase

Data type	Integer	Value	min.	
Unit	ms		max.	
In file	R1\Mada\$machine.dat			
Original line	INT $TM_CON_VEL ;Minimale Konstantfahrphase [ms]			
Comments	To avoid sudden loading of the robot arm due to abrupt changes between acceleration and braking (when there are short distances between points).			

$TOOL

Tool coordinate system relative to the flange coordinate system in the advance run

Data type	Structure	Value min.	
Unit	mm, °	Value max.	
In file	---		
Original line	FRAME $TOOL ;Werkzeug im Flanschkoordinatensystem Vorlauf		
Comments			

$TOOL.A

Rotation about the Z axis

Data type	Real	Value min.	
Unit	°	Value max.	

$TOOL.B

Rotation about the Y axis

$TOOL.C

Rotation about the X axis

$TOOL.X

Offset in the X direction

Data type	Real	Value min.	
Unit	mm	Value max.	

$TOOL.Y

Offset in the Y direction

$TOOL.Z

Offset in the Z direction

$TOOL_C

Tool coordinate system relative to the flange coordinate system in the main run

Data type	Structure	Value	min.	
Unit	mm, °		max.	
In file	---			
Original line	FRAME $TOOL_C ;Werkzeug im Flanschkoordinatensystem Hauptlauf			
Comments				

$TOOL_C.A

Rotation about the Z axis

Data type	Real	Value	min.	
Unit	°		max.	

$TOOL_C.B

Rotation about the Y axis

$TOOL_C.C

Rotation about the X axis

$TOOL_C.X

Offset in the X direction

Data type	Real	Value	min.	
Unit	mm		max.	

$TOOL_C.Y

Offset in the Y direction

$TOOL_C.Z

Offset in the Z direction

$TOOL_KIN

Name of the external TOOL kinematic system

Data type	Character	Value	min.	
Unit			max.	
In file	---			
Original line	CHAR $TOOL_KIN[29] ;Externe Kinematikachsen in TOOL			
Comments				

$TORQ_DIFF[n] — Maximum torque deviation of the individual axes

Data type	Integer	Value	min.	
Unit	%		max.	
In file	---			
Original line	INT $TORQ_DIFF[n]			
Comments	[n] = [1] ... [6] Specifies the maximum torque deviation in %; the only value the user can set it to is zero. This system variable can be used to optimize the torque monitoring (collision detection). Before a motion path section, the variable is set to zero in the KRL program; at the end of a motion instruction or a motion path section, $TORQ_DIFF[] can be read, and the monitoring tunnel $TORQMON[] set to the value of $TORQ_DIFF[] (+5...10% safety margin).			

$TORQ_VEL[n] — Velocity limitation for monitoring the torque-driven axis

Data type	Real	Value	min.	
Unit	%		max.	
In file	---			
Original line	REAL $TORQ_VEL[n]			
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6 Velocity limit in % of the maximum velocity for monitoring the torque-driven axis [n]. When an axis is in torque mode, all monitoring functions are disabled. Hardware defects or an axis “runaway” can nevertheless be detected by monitoring the velocity. The maximum permissible velocity in operating modes Automatic and T2 can be set in the program by means of $TORQ_VEL. In mode T1, the velocity set in the machine data applies. If this velocity is exceeded, the drives are switched off and a corresponding error message is generated.			

$TORQMON[6] Torque monitoring tunnel in program mode

Data type	Integer	Value	min.	
Unit	%		max.	
In file	---			
Original line	INT $TORQMON[6] ;Momentenueberwachungsschlauch im Programmbetrieb [%]			
Comments				

$TORQMON_COM[6] Torque monitoring tunnel in command mode

Data type	Integer	Value	min.	
Unit			max.	
In file	---			
Original line	INT $TORQMON_COM[6] ;Momentenueberwachungsschlauch im Kommandobetrieb [%]			
Comments				

$TORQMON_COM_DEF[6] Default values for torque monitoring tunnel in command mode

Data type	Integer	Value	min.	
Unit	%		max.	
In file	Steu\Mada\$custom.dat			
Original line	INT $TORQMON_COM_DEF[6]			
Comments				

$TORQMON_DEF[6] Default values for torque monitoring tunnel in program mode

Data type	Integer	Value	min.	
Unit	%		max.	
In file	Steu\Mada\$custom.dat			
Original line	INT $TORQMON_DEF[6]			
Comments				

$TORQMON_TIME

Response time of the motion torque monitoring function

Data type	Real	Value min.	
Unit	ms	Value max.	
In file	Steu\Mada\$custom.dat		
Original line	REAL $TORQMON_TIME		
Comments	Response time of the motion torque monitoring function.		

$TORQUE_AXIS

Axis in position when command value reached – A1 ... A6, E1 ... E6

Data type	Integer	Value min.	
Unit		Value max.	
In file	---		
Original line	INT $TORQUE_AXIS		
Comments	Bit array for torque-driven axes A1 - A6, E1 - E6. If a bit for a given axis is set, then there will be no waiting at the end of the motion for the axis to reach its positioning window. As soon as the command value has reached the target position, the next block will be executed. **The axis monitoring functions are switched off**. Changing the value of this variable triggers an advance run stop. **Example:** Switch axis 1 to torque mode: $TORQUE_AXIS = 'B000001'		

$TOUCH_ACC

Retract acceleration for touch sensor

Data type	Integer	Value min.	
Unit	%	Value max.	
In file	R1\Mada\$machine.dat		
Original line	INT $TOUCH_ACC		
Comments			

$TOUCH_SVEL

Start velocity for touch sensor

Data type	Integer	Value	min.	
Unit	%		max.	
In file	R1\Mada\$machine.dat			
Original line	INT $TOUCH_SVEL			
Comments	Start velocity of touch sensor as a percentage of the search velocity.			

$TOUCH_VEL

Maximum retract velocity of the touch sensor

Data type	Integer	Value	min.	
Unit	%		max.	
In file	R1\Mada\$machine.dat			
Original line	INT $TOUCH_VEL			
Comments				

$TRACE

Parameters for the trace function

Data type	Structure	Value	min.	
Unit			max.	
In file	---			
Original line	DECL TRACE $TRACE			
Comments				

$TRACE.MODE

Trace function control

Data type	Enum	Value	min.	
Unit			max.	

Options	Effect
#START	Start TRACE

$TRACE.NAME

Name of the file in which the data are recorded

Data type	Character	Value	min.	
Unit			max.	

$TRACE.STATE

State of the trace function

Data type	Enum	Value	min.	
Unit			max.	

Options	Effect
#T_WAIT	
#TRIGGERED	
#T_END	

$TRAFO_AXIS

Number of transformed axes

Data type	Integer	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	INT $TRAFO_AXIS=6 ;Anzahl der transformierten Achsen			
Comments				

$TRAFONAME

Name of coordinate transformation

Data type	Character	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	CHAR $TRAFONAME[32] ;Name der Koordinatentransformation			
Comments				

$TRANSSYS — Translation reference system

Data type	Enum	Value min.	
Unit		Value max.	
In file	---		
Original line	DECL TRANSSYS $TRANSSYS ;WORLD, BASE, ROBROOT, TCP		
Comments			

Options	Effect
#WORLD	
#BASE	
#ROBROOT	
#TCP	

$TRP_A — Trapezoidal link of the axis drives

Data type	Structure	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	DECL TRPSPIN $TRP_A={TRPSP_AXIS 0,TRPSP_COP_AX 0, TRPSP_A 0.0,TRPSP_B 0.0,TRPSP_C 0.0,TRPSP_D 0.0}		
Comments	Describes a trapezoidal link of the axis drives. TRP_A.TRPSP_AXIS: driven axis. TRP_A.TRPSP_COP_AXIS: coupled axis. TRP_A.TRPSP_A, B, C and D: lengths of the four trapezoid sides.		

$TRP_A.TRPSP_A — Length of trapezoid side “A”

Data type	Real	Value min.	
Unit		Value max.	

$TRP_A.TRPSP_AXIS — Driven axis

Data type	Integer	Value min.	
Unit		Value max.	

$TRP_A.TRPSP_B — Length of trapezoid side “B”

Data type	Real	Value min.	
Unit		Value max.	

$TRP_A.TRPSP_C — Length of trapezoid side “C”

$TRP_A.TRPSP_COP_AX — Coupled axis

Data type	Integer	Value min.	
Unit		Value max.	

$TRP_A.TRPSP_D — Length of trapezoid side “D”

Data type	Real	Value min.	
Unit		Value max.	

$TSYS — Current TTS in relation to the base coordinate system

Data type	Structure	Value min.	
Unit		Value max.	
In file	---		
Original line	FRAME $TSYS ;Aktuelles Technologie-Dreibein bezogen auf BASE		
Comments			

$TURN — Rotational adjustment active

Data type	Boolean	Value min.	
Unit		Value max.	
In file	---		
Original line	BOOL $TURN ;Drehjustage aktiv		
Comments			

Options	Effect
TRUE	Rotational adjustment active
FALSE	Rotational adjustment not active

$TX3P3

Offset of robot wrist, based on axis 3

Data type	Structure	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	FRAME $TX3P3={x 1000.0,y 0.0,z 45.0,a 0.0,b 90.0,c 0.0}			
Comments				

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$USER_SAF

Signal declaration “Safety gate monitoring”

Data type	Signal declaration	Value min.	
Unit		max.	
In file	Steu\Mada\$machine.dat		
Original line	SIGNAL $USER_SAF $OUT[1011]		
Comments			

22 V

$V_CUSTOM

Version identifier of the file “$Custom.dat”

Data type	Character	Value	min.	
Unit			max.	
In file	Steu\Mada\$custom.dat			
Original line	CHAR $V_CUSTOM[32]			
Comments				

$V_OPTION

Version identifier of the file “$Option.dat”

Data type	Character	Value	min.	
Unit			max.	
In file	Steu\Mada\$option.dat			
Original line	CHAR $V_OPTION[32]			
Comments				

$V_R1MADA

Version identifier of machine data in the directory R1

Data type	Character	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	CHAR $V_R1MADA[32]			
Comments				

$V_ROBCOR

Version identifier of the file “Robcor.dat”

Data type	Character	Value	min.	
Unit			max.	
In file	R1\Mada\$robcor.dat			
Original line	CHAR $V_ROBCOR[32]			
Comments				

$V_STEUMADA

Version identifier of the file “$machine.dat” in the directory \Steu

Data type	Character	Value	min.	
Unit			max.	
In file	Steu\Mada\$machine.dat			
Original line	CHAR $V_STEUMADA[32]			
Comments				

$VEL

Velocities in the advance run

Data type	Structure	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	DECL CP $VEL			
Comments	Velocities in the advance run CP = m/s, ORI1 = °/s, ORI2 = °/s			

$VEL.CP

CP velocity in the advance run

Data type	Real	Value	min.	> 0
Unit	m/s		max.	

$VEL.ORI1

Swivel velocity in the advance run

Data type	Real	Value	min.	
Unit	°/s		max.	

$VEL.ORI2

Rotational velocity in the advance run

$VEL_ACT

Current CP velocity

Data type	Real	Value	min.	> 0
Unit	m/s		max.	$VEL_MA.CP
In file	R1\Mada\$machine.dat			
Original line	REAL $VEL_ACT			
Comments				

$VEL_ACT_MA — Limit value of axial command velocity

Data type	Integer	Value	min.	
Unit	%		max.	
In file	R1\Mada\$machine.dat			
Original line	INT $VEL_ACT_MA ;Grenzwert Sollgeschwindigkeit [%]			
Comments	In jog mode and T1 mode, the limits are reduced by the value of the velocity reduction factor in T1. In PTP motions, the acceleration of the higher motion profile is calculated on the basis of a robot model.			

$VEL_AX_JUS[n] — Velocity of individual axes for EMT mastering

Data type	Real	Value	min.	
Unit	°/s, mm/s		max.	
In file	R1\Mada\$machine.dat			
Original line	REAL $VEL_AX_JUS[n]			
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6			

$VEL_AXIS[n] — Velocity of the axes in the advance run

Data type	Integer	Value	min.	1
Unit	%		max.	100
In file	---			
Original line	INT $VEL_AXIS[n]			
Comments	[n] = [1] ... [6]: axis A1 ... A6			

$VEL_AXIS_ACT[n] — Current axis velocity relative to the maximum velocity

Data type	Real	Value	min.	-100
Unit	%		max.	100
In file	---			
Original line	REAL $VEL_AXIS_ACT[n]			
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6			

$VEL_AXIS_C[n] — Velocity of the axes in the main run

Data type	Integer	Value	min.	1
Unit	%		max.	100
In file	---			
Original line	INT $VEL_AXIS_C[n]			
Comments	[n] = [1] ... [6]: axis A1 ... A6			

$VEL_AXIS_MA[n] — Rated speed of the motors of the individual axes

Data type	Real	Value	min.	
Unit	1/min		max.	
In file	---			
Original line	REAL $VEL_AXIS_MA[n]			
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6			

$VEL_C — Velocities in the main run

Data type	Structure	Value	min.	
Unit			max.	
In file	---			
Original line	DECL CP $VEL_C			
Comments	Velocities in the main run CP = m/s, ORI1 = °/s, ORI2 = °/s			

$VEL_C.CP — CP velocity in the main run

Data type	Real	Value	min.	> 0
Unit	m/s		max.	

$VEL_C.ORI1 — Swivel velocity in the main run

Data type	Real	Value	min.	
Unit	°/s		max.	

$VEL_C.ORI2 — Rotational velocity in the main run

$VEL_CP_COM

Reduction factor for the flange velocity in reorientation motions of the tool

Data type	Real	Value	min.	
Unit	m/s		max.	
In file	R1\Mada\$machine.dat			
Original line	REAL $VEL_CP_COM ;Reduzierung der Flanschgeschwindigkeit in [m/s]			
Comments				

$VEL_CP_T1

CP velocity in Test 1 mode

Data type	Real	Value	min.	
Unit	m/s		max.	
In file	R1\Mada\$machine.dat			
Original line	REAL $VEL_CP_T1 ;Bahngeschwindigkeit in T1 [m/s]			
Comments				

$VEL_ENC_CO

Speed command value threshold for encoder monitoring

Data type	Integer	Value	min.	
Unit	Inkr		max.	
In file	R1\Mada\$machine.dat			
Original line	INT $VEL_ENC_CO			
Comments				

$VEL_EXTAX[n]

Axis velocity of the external axes in the advance run

Data type	Integer	Value	min.	
Unit	%		max.	
Original line	INT $VEL_EXTAX[n]			
Comments	[n]= [1] ... [6]: external axis E1 ... E6			

$VEL_EXTAX_C[n] — Axis velocity of the external axes in the main run

Data type	Integer	Value	min.	
Unit	%		max.	
In file				
Original line	INT $VEL_EXTAX_C[n]			
Comments	[n]= [1] ... [6]: external axis E1 ... E6			

$VEL_FILT[n] — Tacho filter

Data type	Real	Value	min.	
Unit	ms		max.	
In file	R1\Mada\$machine.dat			
Original line	REAL $VEL_FILT[n]			
Comments	[n] = [1] ... [6]: axis A1 ... A6 [n] = [7] ... [12]: external axis E1 ... E6			

$VEL_FLT_OFF — Calculation of velocity from filtered or unfiltered setpoints

Data type	Boolean	Value	min.	
Unit			max.	
In file	Steu\Mada\$custom.dat			
Original line	BOOL $VEL_FLT_OFF=TRUE			
Comments	If this variable is set to “TRUE”, the value of the system variable “$ANA_DEL_FLT” must first be set to “ON”.			

Options	Effect
TRUE	Calculation of velocity from filtered setpoints. The velocity values need no longer be filtered.
FALSE	Calculation of velocity from unfiltered setpoints. The velocity values must be filtered.

$VEL_MA

Data for maximum CP, swivel and rotational velocity

Data type	Structure	Value min.	
Unit		Value max.	
In file	R1\Mada\$machine.dat		
Original line	DECL CP $VEL_MA={CP 1.75,ORI1 400.0,ORI2 400.0}		
Comments	CP = Max. CP velocity [m/s], ORI1 = Max. swivel velocity [°/s], ORI2 = Max. rotational velocity [°/s]		

$VEL_MA.CP

Maximum CP velocity

Data type	Real	Value min.	
Unit	m/s	Value max.	
Comments	Cartesian motions are carried out with the velocity RED_VEL_CPC*VEL_MA.CP		

$VEL_MA.ORI1

Maximum swivel velocity

Data type	Real	Value min.	
Unit	°/s	Value max.	
Comments	Cartesian swivel motions are carried out with the velocity RED_VEL_CPC*VEL_MA.ORI1		

$VEL_MA.ORI2

Maximum rotational velocity

Comments	Rotational motions are carried out with the velocity RED_VEL_CPC*VEL_MA.ORI2

23 W

$WAIT_FOR[470] Interpreter waiting at a WAIT FOR statement

Data type	Character	Value	min.	
Unit			max.	
In file	---			
Original line	CHAR $WAIT_FOR[470]			
Comments				

$WAIT_FOR_ON Interpreter waiting at a condition

Data type	Boolean	Value	min.	
Unit			max.	
In file	---			
Original line	BOOL $WAIT_FOR_ON			
Comments				

Options	Effect
TRUE	Interpreter is waiting at a condition
FALSE	Interpreter is not waiting at a condition

$WBOXDISABLE Workspace monitoring on or off

Data type	Boolean	Value	min.	
Unit			max.	
In file	---			
Original line	BOOL $WBOXDISABLE			
Comments				

Options	Effect
TRUE	Working envelope monitoring is switched on
FALSE	Working envelope monitoring is switched off

$WORKSPACE[n] — Definition of workspace monitoring

Data type	Structure	Value min.	
Unit		Value max.	
In file	Steu\Mada\$custom.dat		
Original line	DECL BOX $WORKSPACE[n]		
Comments	[n] = [1] ... [8]		

$WORKSPACE[n].MODE — Functional principle of the workspace monitoring function

Data type	Enum	Value min.	
Unit		Value max.	

Options	Effect
#OFF	Workspace monitoring deactivated
#INSIDE	The output is set if the TCP is located inside the workspace
#OUTSIDE	The output is set if the TCP is located outside the workspace
#INSIDE_STOP	The output is set and the robot stopped if the TCP is located inside the workspace
#OUTSIDE_STOP	The output is set and the robot stopped if the TCP is located outside the workspace

$WORKSPACE[n].STATE — Violation of the workspace

Data type	Boolean	Value min.	
Unit		Value max.	

Options	Effect
TRUE	The workspace has been violated
FALSE	The workspace has not been violated

$WORKSPACE_NAMEn[24] — Name of the particular workspace

Data type	Character	Value min.	
Unit		Value max.	
In file	Steu\Mada\$custom.dat		
Original line	CHAR $WORKSPACE_NAME1[24] $WORKSPACE_NAME1[]=”WORKSPACE 1”		
Comments	n = 1 ... 8		

$WORKSTATE1 ... $WORKSTATE8

Signal declaration “Violation of workspace”

Data type	Signal declaration	Value	min.	
Unit			max.	
In file	Steu\Mada\$machine.dat			
Original line	SIGNAL $WORKSTATE1 $OUT[984] ... SIGNAL $WORKSTATE8 $OUT[991]			
Comments				

Options	Effect
$OUT[n]	Output no. 1 ... 4096
FALSE	Outputs that are not required can be set to “FALSE”, e.g. SIGNAL $WORKSTATE1 FALSE

$WORLD

World coordinate system relative to the initial coordinate system

Data type	Structure	Value	min.	
Unit	mm, °		max.	
In file	---			
Original line	FRAME $WORLD			
Comments	Initial coordinate system: So-called origin coordinate system that is identical to the World coordinate system in the KRC controller.			

$WORLD.A

Rotation about the Z axis

Data type	Real	Value	min.	
Unit	°		max.	

$WORLD.B

Rotation about the Y axis

$WORLD.C

Rotation about the X axis

$WORLD.X

Offset in the X direction

Data type	Real	Value	min.	
Unit	mm		max.	

$WORLD.Y

Offset in the Y direction

$WORLD.Z

Offset in the Z direction

$WRIST_AXIS

Wrist axis identification

Data type	Enum	Value	min.	
Unit			max.	
In file	R1\Mada\$machine.dat			
Original line	DECL WRIST_AXIS $WRIST_AXIS=#ZEH			
Comments				

Options	Effect
#NOH	No wrist
#ZEH	In-line wrist
#SRH	Oblique wrist
#DSH	Triple-roll wrist
#WIH	Offset wrist
#WSH	Oblique offset wrist

24 Z

$ZERO_MOVE

Execution of a zero motion block

Data type	Boolean	Value min.	
Unit		max.	
In file	---		
Original line	BOOL $ZERO_MOVE		
Comments	The value TRUE is valid for only one interpolation cycle. Interpolation of zero blocks only during a single interpolation cycle.		

Options	Effect
TRUE	Zero motion block is executed
FALSE	No zero motion block is executed

$ZUST_ASYNC

Enable asynchronous external axes

Data type	Signal declaration	Value min.	
Unit		max.	
In file	Steu\Mada\$machine.dat		
Original line	SIGNAL $ZUST_ASYNC $IN[1026]		
Comments			

Options	Effect
TRUE	Asynchronous external axes enabled
FALSE	Asynchronous external axes not enabled

Zahlen

A

B

C

D

E

F

G

H

I

P

R

S

T

V

W

Z