

OPC UA umati Interface WinNC

gültig für folgende Steuerungen:

EMCO WinNC for Sinumerik Operate T und M ab Version 1.20.0002

EMCO WinNC for Fanuc31i T und M ab Version 1.16.0002

EMCO WinNC for Heidenhain TNC640 ab Version 1.14.0002

valid for following controls:

EMCO WinNC for Sinumerik Operate T and M from version 1.20.0002

EMCO WinNC for Fanuc31i T and M from version 1.16.0002

EMCO WinNC for Heidenhain TNC640 from version 1.14.0002

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Schnittstellenbeschreibung OPC UA umati Interface WinNC

Das OPC UA umati Interface WinNC ist ein umati-kompatibler OPC UA-Server zur Netzwerkanbindung einer Concept Maschine an externe Systeme. Maschinendaten können über diese Schnittstelle ausgelesen werden.

Zusätzlich ist die Steuerung der Maschine über Kommandos möglich, und steuerungsspezifische Parameter können gesetzt werden. Dieses Interface kann mit den folgenden CNC-Steuerungstypen betrieben werden:

- EMCO WinNC for Sinumerik Operate T und M ab Version 1.20.0002
- EMCO WinNC for Fanuc31i T und M ab Version 1.16.0002
- EMCO WinNC for Heidenhain TNC640 ab Version 1.14.0002

Der Server besteht aus den folgenden beiden Diensten:

- EMCO Opcua Backend WinNC Service
- EMCO Opcua Frontend Service

Das Backend wurde als Verbindung zwischen den Steuerungen und dem Frontend OPC UA Server entwickelt, der das Mapping zwischen der Anfrage des Frontend Services via HTTP auf eine spezielle Variablenabfrage oder auf ein Kommando für die jeweilige WinNC-Steuerung übernimmt.

Grundlegende Dokumentation zu umati und OPC UA ist unter <https://documentation.unified-automation.com> und [Machine Tools - Monitoring and Job Overview \(opcfoundation.org\)](https://www.opcfoundation.org/Machine-Tools-Monitoring-and-Job-Overview) zu finden.

Der Server basiert auf der Companion Specification der OPC Foundation

OPC 40501-1: Machine Tools - Monitoring and Job Overview mit *MachineTool Basic Server Profile* mit folgenden Facets:

- MachineTool Monitoring Server Facet
- MachineTool Tools Server Facet
- MachineTool Errors and Alerts Server Facet

Facet: "Profile dedicated to a specific feature that a Server or Client may require"

Jedoch wurde für die Anforderungen, auch Variablen schreiben bzw. Kommandos ausführen zu können, der BaseObjectType *MachineToolType* auf *EMCOMachineToolType* erweitert. Darin wurden auch zusätzliche Variablen definiert, die im umati-Umfang nicht enthalten sind, aber als Rückmeldung auf Kommandos gelesen werden müssen.

Der **MachineToolType** umfasst alle relevanten Informationen zu einer Werkzeugmaschine und strukturiert die Schnittstelle folgendermaßen in folgende obligatorische Komponenten:

- **Identification** (MachineToolIdentificationType)
- **Monitoring** (MonitoringType) -> ChannelMonitoringType
- **Notification** (NotificationType)
- **Production** (ProductionType):
 Unter Production -> ActiveProgram wurde der *ProductionActiveProgramType* als *EmcoProductionActiveProgramType* um die Variable ActProgLine erweitert.
- Equipment -> Tools (ToolListType) -> Tool (ToolType)

Der **EMCOMachineToolType** enthält zusätzlich noch die Knoten:

- **PeripheralDevices** mit den Variablen ClampingDeviceState und DoorState, die den Status des Spannmittels bzw. der Tür abbilden
- **UserParameter:**
 Für jede WinNC-Steuerung gibt es unter Machines.MachineTool1. UserParameter je 10 Variable, die von einem OPC UA Client geschrieben werden können:
 $n=0..9$: Machines.MachineTool1.UserParameter n (*double*), Machines.MachineTool1.StringParameter n

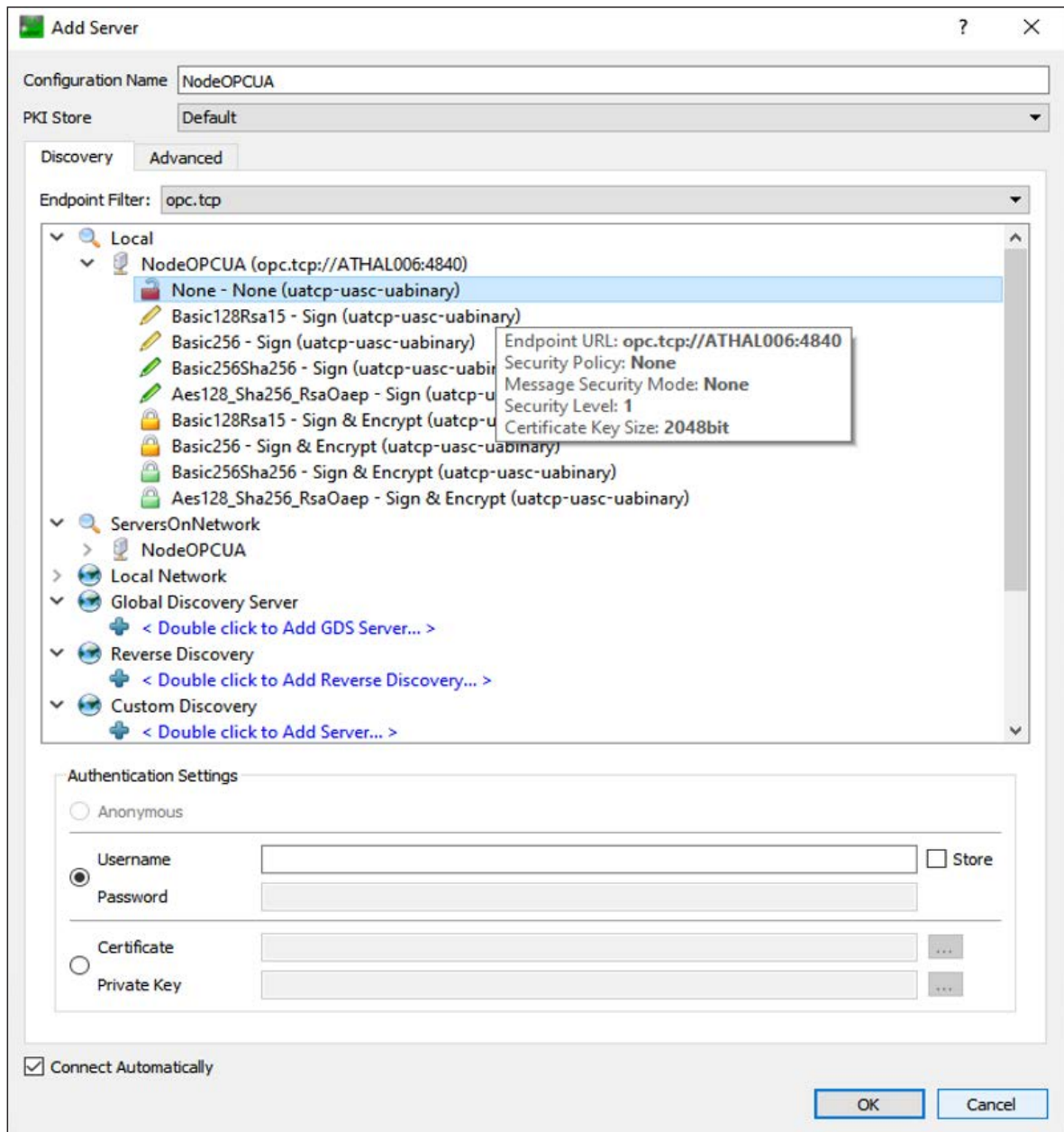
WinNC	Double-Parameter	String-Parameter
Sinumerik Operate	R0 - R9 (R-Parameter)	_TXT[0] - _TXT[9]
Heidenhain TNC640	Q50 - Q59 (Q-Parameter)	QS0 - QS9 (QS-Parameter)
Fanuc 31i	#500 - #509 (Kunden-Makro)	nicht vorhanden

- ControlCommands mit den Kommandos an die Steuerung:
 Folgende Kommandos sind als UAMethods mit einem Argument und einem Rückgabewert implementiert. Das Ergebnis besagt, ob das Kommando erfolgreich an die Steuerung gesendet werden konnte.
 Um zu überprüfen, ob das Kommando auch erfolgreich abgearbeitet wurde, können die passenden Variablen unter Machines.MachineTool1... gelesen werden.

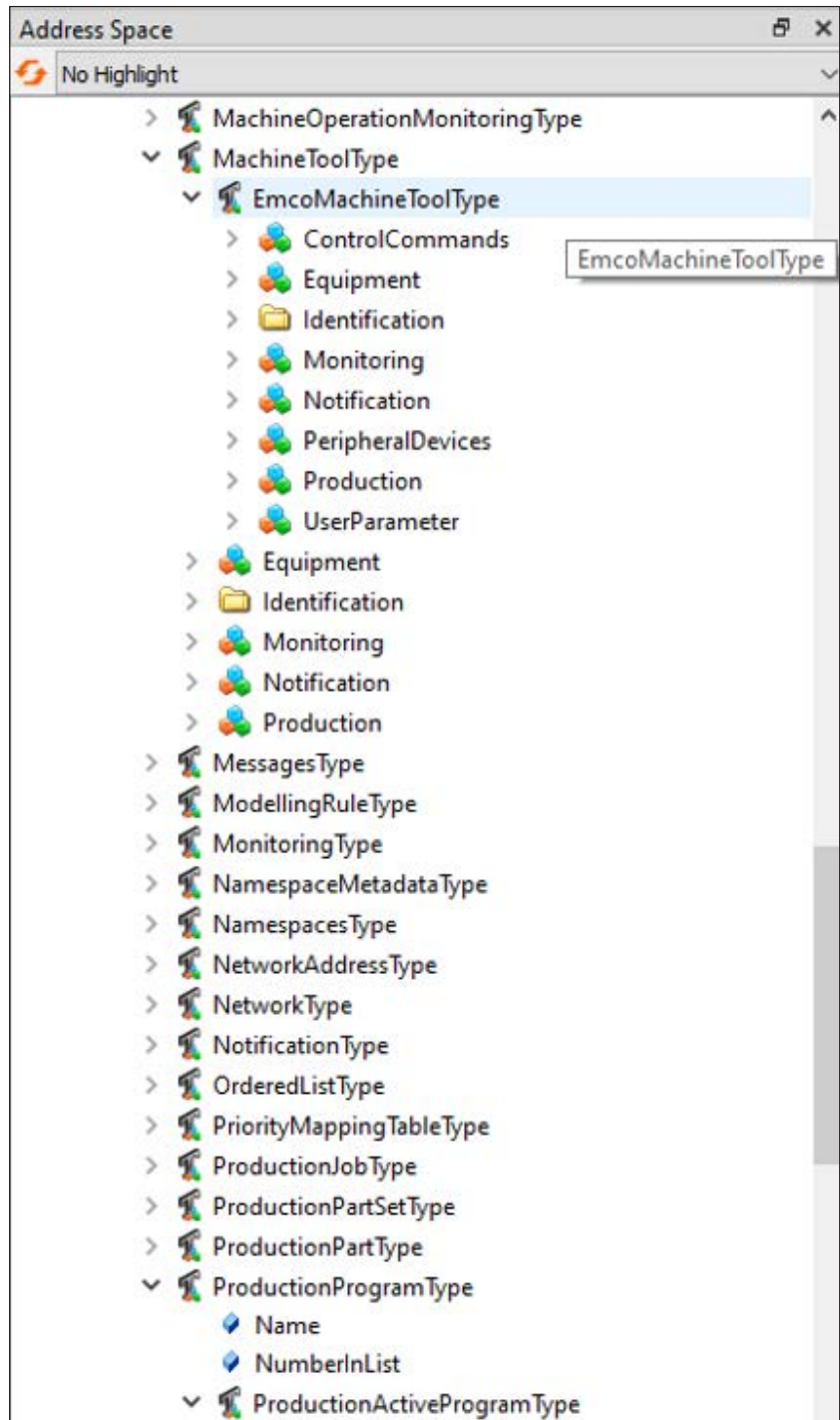
Kommando	Argument	Variable zur Prüfung
Clamping (Spannmittel)	0 (öffnen) 1 (schließen)	PeripheralDevices.ClampingDeviceState
Door (Maschinentür)	0 (öffnen) 1 (schließen) 2 (stopp)	PeripheralDevices.DoorState
OperationMode (Betriebsart wechseln auf)	0 (Automatic) 1 (MdaMdi) 2 (JogManual) 3 (JogIncrement) 6 (Reference)	Monitoring.Channel1.ChannelMode
Reference (Achsen referenzieren)	-1 (alle Linear- und Rundachsen), Bitmaske für einzelne Achsen, z.B. 5 für X/Z	Monitoring.Channel1.Axisn.Referenced
ProgramStart (Programm starten)	1 (Start)	Monitoring.Channel1.ChannelState = 0 (Active)
ProgramStop (Programm anhalten)	1 (Stopp)	Monitoring.Channel1.ChannelState = 1 (Interrupted)
Reset (Reset ausführen)	1 (Reset)	Monitoring.Channel1.ChannelState = 2 (Reset)
SelectProgram	kompletter Pfad oder relativ zum NCFFilePath der Steuerung z.B. C:/WinNC32/hmioperate.m/prg/MPF.DIR/TEST.MPF	Monitoring.Channel1.SelectedProgram
SetFeedOverride (Feed Override setzen)	Integerwert von 0 bis 120 (Prozentangabe)	Monitoring.Channel1.FeedOverride
SetSpeedOverride (Speed Override setzen)	Integerwert von 50 bis 120 (Prozentangabe)	Monitoring.Spindle1.Override
Tool (Werkzeug einwechseln)	Werkzeugnummer	Monitoring.Channel1.ActTool

Die folgenden Screenshots veranschaulichen die verfügbaren Variablen und Kommandos mithilfe des freien OPC UA Clients UAExpert.

Der OPC UA-Server kann entweder mit reinem Lesezugriff anonym oder mit den Zugangsdaten *user: admin, password: pw1* verbunden werden.



Im Address Space im UAExpert können die Typdefinitionen angezeigt werden:



Im Address Space unter Root->Objects->Machines finden sich die oben beschriebenen Kommandos und Variablen. Die Knoten-IDs und Werte der Variablen lassen sich im Data Access View durch Verschieben in diesen Bereich anzeigen.

The screenshot displays the OPC UA UMATI interface. On the left, the 'Address Space' tree shows a hierarchy: Root > Objects > Machines > EMCOMachineTool > ControlCommands > CommandsObject > Clamping > Door > OperationMode > ProgramStart > ProgramStop > Reference > Reset > SelectProgram > SetFeedOverride > SetSpeedOverride > Tool > Equipment > Tools > NodeVersion > Tool1 > Tool2. The main window shows the 'Data Access View' table with the following columns: #, Server, Node Id, Display Name, and Value.

#	Server	Node Id	Display Name	Value
1	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.StacklightMode	StacklightMode	0 (Segmented)
2	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.Light0.IsPartOfBase	IsPartOfBase	false
3	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.Light0.NumberInList	NumberInList	0
4	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.Light0.SignalColor	SignalColor	1 (Red)
5	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.Light0.SignalMode	SignalMode	0 (Continuous)
6	OPC UA Server	NS6[String Machines.MachineTool1.Equipment.Tools.NodeVersion	NodeVersion	2023-10-24T12:36:39.236
7	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.BlockSkip	BlockSkip	false
8	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.DryRun	DryRun	false
9	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.OptionalStop	OptionalStop	false
10	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.SingleStep	SingleStep	false
11	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.StacklightMode	StacklightMode	0 (Segmented)
12	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.MachineTool.OperationMode	OperationMode	0 (Manual)
13	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelMode	ChannelMode	2 (JogManual)
14	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelState	ChannelState	2 (Reset)
15	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.FeedOverride	FeedOverride	55
16	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.Name	Name	Channel1
17	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.FeedOverride.EURange	EURange	Double click to display value
18	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.FeedOverride.EngineeringUnits	EngineeringUnits	Double click to display value
19	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.BlockSkip	BlockSkip	false
20	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.DryRun	DryRun	false
21	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.OptionalStop	OptionalStop	false
22	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.SingleStep	SingleStep	false
23	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.Light0.IsPartOfBase	IsPartOfBase	false
24	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.Light0.NumberInList	NumberInList	0
25	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.Light0.SignalColor	SignalColor	1 (Red)
26	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.Light0.SignalMode	SignalMode	0 (Continuous)
27	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ActTool	ActTool	0
28	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelMode	ChannelMode	2 (JogManual)
29	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelState	ChannelState	2 (Reset)
30	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.FeedOverride	FeedOverride	55
31	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.Name	Name	Channel1
32	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.SelectedProgram	SelectedProgram	
33	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.FeedOverride.EURange	EURange	Double click to display value
34	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.FeedOverride.EngineeringUnits	EngineeringUnits	Double click to display value
35	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.BlockSkip	BlockSkip	false
36	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.DryRun	DryRun	false
37	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.OptionalStop	OptionalStop	false
38	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.SingleStep	SingleStep	false
39	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.Axis3.Name	Name	Z
40	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.Axis3.Position	Position	0.335
41	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.Axis3.Referenced	Referenced	true
42	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.Axis2.Name	Name	
43	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.Axis2.Position	Position	0

Gesetzt werden kann ein Wert im Data Access View unter Value, wenn die Variable schreibbar ist, ansonsten wird im Log-Fenster ein Fehler ausgegeben.
Nur die UserParameter und StringParameter sind schreibbar.

The screenshot shows the 'Data Access View' window in Unified Automation UaExpert. It displays a table with columns for '#', 'Server', 'Node Id', and 'Display Name'. The table lists various OPC UA nodes, including monitoring channels and user/string parameters. The 'Log' window at the bottom shows a series of messages, including successful attribute reads and writes for user parameters.

#	Server	Node Id	Display Name	Value
11	NodeOPCUA	NS6(String)Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.OptionalStop	OptionalStop	false
12	NodeOPCUA	NS6(String)Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.SingleStep	SingleStep	false
13	NodeOPCUA	NS6(String)Machines.MachineTool1.Monitoring.Channel1.Axis3.Name	Name	Z
14	NodeOPCUA	NS6(String)Machines.MachineTool1.Monitoring.Channel1.Axis3.Position	Position	0.19225
15	NodeOPCUA	NS6(String)Machines.MachineTool1.Monitoring.Channel1.Axis3.Referenced	Referenced	true
16	NodeOPCUA	NS6(String)Machines.MachineTool1.Monitoring.Channel1.Axis2.Name	Name	Y
17	NodeOPCUA	NS6(String)Machines.MachineTool1.Monitoring.Channel1.Axis2.Position	Position	0.125334
18	NodeOPCUA	NS6(String)Machines.MachineTool1.Monitoring.Channel1.Axis2.Referenced	Referenced	true
19	NodeOPCUA	NS6(String)Machines.MachineTool1.Monitoring.Channel1.Axis1.Name	Name	X
20	NodeOPCUA	NS6(String)Machines.MachineTool1.Monitoring.Channel1.Axis1.Position	Position	0.288093
21	NodeOPCUA	NS6(String)Machines.MachineTool1.Monitoring.Channel1.Axis1.Referenced	Referenced	true
22	NodeOPCUA	NS6(String)Machines.MachineTool1.Monitoring.Channel1.Axis1.Position.EngineeringUnits	EngineeringUnits	Double cl
23	NodeOPCUA	NS6(String)Machines.MachineTool1.Monitoring.Channel1.Axis2.Position.EngineeringUnits	EngineeringUnits	Double cl
24	NodeOPCUA	NS6(String)Machines.MachineTool1.Monitoring.Channel1.Axis3.Position.EngineeringUnits	EngineeringUnits	Double cl
25	NodeOPCUA	NS6(String)Machines.MachineTool1.StringParameter.Value0	StringParameter0	
26	NodeOPCUA	NS6(String)Machines.MachineTool1.StringParameter.Value1	StringParameter1	
27	NodeOPCUA	NS6(String)Machines.MachineTool1.StringParameter.Value2	StringParameter2	
28	NodeOPCUA	NS6(String)Machines.MachineTool1.StringParameter.Value3	StringParameter3	test
29	NodeOPCUA	NS6(String)Machines.MachineTool1.StringParameter.Value4	StringParameter4	
30	NodeOPCUA	NS6(String)Machines.MachineTool1.StringParameter.Value5	StringParameter5	
31	NodeOPCUA	NS6(String)Machines.MachineTool1.StringParameter.Value6	StringParameter6	
32	NodeOPCUA	NS6(String)Machines.MachineTool1.StringParameter.Value7	StringParameter7	
33	NodeOPCUA	NS6(String)Machines.MachineTool1.StringParameter.Value8	StringParameter8	
34	NodeOPCUA	NS6(String)Machines.MachineTool1.StringParameter.Value9	StringParameter9	
35	NodeOPCUA	NS6(String)Machines.MachineTool1.UserParameter.Value0	UserParameter0	0
36	NodeOPCUA	NS6(String)Machines.MachineTool1.UserParameter.Value1	UserParameter1	0
37	NodeOPCUA	NS6(String)Machines.MachineTool1.UserParameter.Value2	UserParameter2	0.78965
38	NodeOPCUA	NS6(String)Machines.MachineTool1.UserParameter.Value3	UserParameter3	23.2
39	NodeOPCUA	NS6(String)Machines.MachineTool1.UserParameter.Value4	UserParameter4	0
40	NodeOPCUA	NS6(String)Machines.MachineTool1.UserParameter.Value5	UserParameter5	0
41	NodeOPCUA	NS6(String)Machines.MachineTool1.UserParameter.Value6	UserParameter6	5.5555
42	NodeOPCUA	NS6(String)Machines.MachineTool1.UserParameter.Value7	UserParameter7	0
43	NodeOPCUA	NS6(String)Machines.MachineTool1.UserParameter.Value8	UserParameter8	0
44	NodeOPCUA	NS6(String)Machines.MachineTool1.UserParameter.Value9	UserParameter9	0

The screenshot shows the 'EASY2CONTROL' interface. It features a table of 'R variables' with columns for variable names (R 0 to R 16) and their corresponding values. The value for R 3 is highlighted in orange and set to 23.2. The interface also includes a search bar and a numeric keypad.

R Variable	Value
R 0	0
R 1	0
R 2	0.78965
R 3	23.2
R 4	0
R 5	0
R 6	5.5555
R 7	0
R 8	0
R 9	0
R 10	0
R 11	0
R 12	0
R 13	0
R 14	0
R 15	0
R 16	0

Alarmer der Steuerung werden zyklisch gesendet und im EventView des UAExpert angezeigt. Dazu muss unter Configuration der Knoten AlarmCondition hinzugefügt werden.

WinCC for Sinumerik Operate

17190 ↓ Block 4 illegal T number TEST

NC/ZUGPROBE_DECCA/4MM_M6 **emco**

active OPCUA

Workpiece	Position [mm]	Dist-to-go [mm]	T,F,S
∅ X	103.000	0.000	T
Z	46.720	0.000	F
			R0.000 D1
			0.000 mm/min 100%
S1	0		100%
Master	0		100%

G54

NC/ZUGPROBE_DECCA/4MM_M6

T="TEST"

Unified Automation UaExpert - The OPC Unified Architecture Client - emco_umat2

File View Server Document Settings Help

Project: OPC UA Server, anonymEmcoUmati

Address Space: Root, Objects, Alarms&Conditions, AlarmCondition

Configuration: Server/Object: OPC UA Server / AlarmCondition

Events:

Time	Severity	Server/Object	SourceName	Message	EventType	Active
16:36:42.900	750	OPC UA Server ...	5:Messages	Block 4 illegal T number TEST	AlertType	Active
16:36:42.901	750	OPC UA Server ...	5:Messages	X+ Software limit overtravel	AlertType	Active
16:36:43.916	750	OPC UA Server ...	5:Messages	Block 4 illegal T number TEST	AlertType	Active
16:36:43.917	750	OPC UA Server ...	5:Messages	X+ Software limit overtravel	AlertType	Active
16:36:44.924	750	OPC UA Server ...	5:Messages	Block 4 illegal T number TEST	AlertType	Active
16:36:44.925	750	OPC UA Server ...	5:Messages	X+ Software limit overtravel	AlertType	Active
16:36:45.932	750	OPC UA Server ...	5:Messages	Block 4 illegal T number TEST	AlertType	Active
16:36:45.933	750	OPC UA Server ...	5:Messages	X+ Software limit overtravel	AlertType	Active

Details:

Name	Value
ConditionId	NodeId
NamespaceIndex	1
IdentifierType	Numeric
Identifier	1032
AckedState/Id	False
ActiveState	"", "Active"
ActiveState/Id	True
BranchId	NodeId
NamespaceIndex	0
IdentifierType	Numeric
Identifier	0

Log:

Timestamp	Source	Server	Message
24.10.2023 16:35:01.879	Event Plugin	OPC UA Server	SelectClause [1]: badNoMatch
24.10.2023 16:35:01.879	Event Plugin	OPC UA Server	SelectClause [18]: badNothingToDo
24.10.2023 16:35:01.879	Event Plugin	OPC UA Server	Calling ConditionRefresh to get current conditions
24.10.2023 16:35:01.885	Event Plugin	OPC UA Server	Call ConditionRefresh returned Good for ServerId OPC UA Server.
24.10.2023 16:36:29.111	AddressSpaceModel	OPC UA Server	Browse on node 'ns=4:i=1001' succeeded.
24.10.2023 16:36:30.257	AddressSpaceModel	OPC UA Server	Browse on node 'ns=6:s=Machines.MachineTool1' succeeded.
24.10.2023 16:36:32.519	AddressSpaceModel	OPC UA Server	Browse on node 'ns=6:i=1001' succeeded.
24.10.2023 16:36:33.528	AddressSpaceModel	OPC UA Server	Browse on node 'ns=6:i=1011' succeeded.
24.10.2023 16:36:34.458	AddressSpaceModel	OPC UA Server	Browse on node 'ns=6:i=1008' succeeded.
24.10.2023 16:36:36.939	AddressSpaceModel	OPC UA Server	Browse on node 'ns=1:i=1032' succeeded.
24.10.2023 16:36:40.417	Attribute Plugin	OPC UA Server	Read attributes of node 'NS1[Numeric]1032' succeeded [ret = Good].
24.10.2023 16:36:40.421	Reference Plugin	OPC UA Server	Browse succeeded.

Hier noch ein Beispiel zur Prüfung, ob die Steuerung ein Kommando korrekt umgesetzt hat:

- Aufruf des Kommandos OperationMode mit dem Argument 2 (JogManual):

The screenshot shows the UaExpert interface with a table of OPC UA nodes. The 'ChannelMode' node (Node Id: NS5(String)Machines.MachineTool1.Monitoring.Channel1.ChannelMode) is highlighted with a red box, showing a value of 0 (Automatic). The 'OperationMode' node is also visible in the tree view on the left.

#	Server	Node Id	Display Name	Value	DataType
1	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.ActTool	ActTool	0	UInt32
2	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.ChannelMode	ChannelMode	0 (Automatic)	Int32
3	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.ChannelState	ChannelState	2 (Reset)	Int32
4	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.FeedOverride	FeedOverride	100	Double
5	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Name	Name	Channel1	String
6	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.SelectedProgram	SelectedProgram	C:/WinNC_festoFreigabe/HM/operate.M/PRG/MPF.DIR/...	String
7	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.FeedOverride.EURange	EURange	Double click to display value	ExtensionOf
8	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.FeedOverride.EngineeringUnits	EngineeringUnits	Double click to display value	ExtensionOf
9	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.BlockSkip	BlockSkip	false	Boolean
10	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.DryRun	DryRun	false	Boolean
11	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.OptionalStop	OptionalStop	false	Boolean
12	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.SingleStep	SingleStep	false	Boolean
13	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis3.Name	Name	Z	String
14	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis3.Position	Position	0.19225	Double
15	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis3.Referenced	Referenced	true	Boolean
16	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis2.Name	Name	Y	String
17	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis2.Position	Position	0.125334	Double
18	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis2.Referenced	Referenced	true	Boolean
19	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis1.Name	Name	X	String
20	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis1.Position	Position	0.288093	Double
21	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis1.Referenced	Referenced	true	Boolean
22	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis1.Position.EngineeringUnits	EngineeringUnits	Double click to display value	ExtensionOf
23	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis2.Position.EngineeringUnits	EngineeringUnits	Double click to display value	ExtensionOf
24	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis3.Position.EngineeringUnits	EngineeringUnits	Double click to display value	ExtensionOf
25	NodeOPCUA	NS5(String)Machines.MachineTool1.StringParameter.Value0	StringParameter0		String
26	NodeOPCUA	NS5(String)Machines.MachineTool1.StringParameter.Value1	StringParameter1		String
27	NodeOPCUA	NS5(String)Machines.MachineTool1.StringParameter.Value2	StringParameter2		String
28	NodeOPCUA	NS5(String)Machines.MachineTool1.StringParameter.Value3	StringParameter3		String
29	NodeOPCUA	NS5(String)Machines.MachineTool1.StringParameter.Value4	StringParameter4		String
30	NodeOPCUA	NS5(String)Machines.MachineTool1.StringParameter.Value5	StringParameter5		String
31	NodeOPCUA	NS5(String)Machines.MachineTool1.StringParameter.Value6	StringParameter6		String
32	NodeOPCUA	NS5(String)Machines.MachineTool1.StringParameter.Value7	StringParameter7		String
33	NodeOPCUA	NS5(String)Machines.MachineTool1.StringParameter.Value8	StringParameter8		String
34	NodeOPCUA	NS5(String)Machines.MachineTool1.StringParameter.Value9	StringParameter9		String
35	NodeOPCUA	NS5(String)Machines.MachineTool1.UserParameter.Value0	UserParameter0	0	Double
36	NodeOPCUA	NS5(String)Machines.MachineTool1.UserParameter.Value1	UserParameter1	0	Double
37	NodeOPCUA	NS5(String)Machines.MachineTool1.UserParameter.Value2	UserParameter2	0.78965	Double
38	NodeOPCUA	NS5(String)Machines.MachineTool1.UserParameter.Value3	UserParameter3	23.2	Double

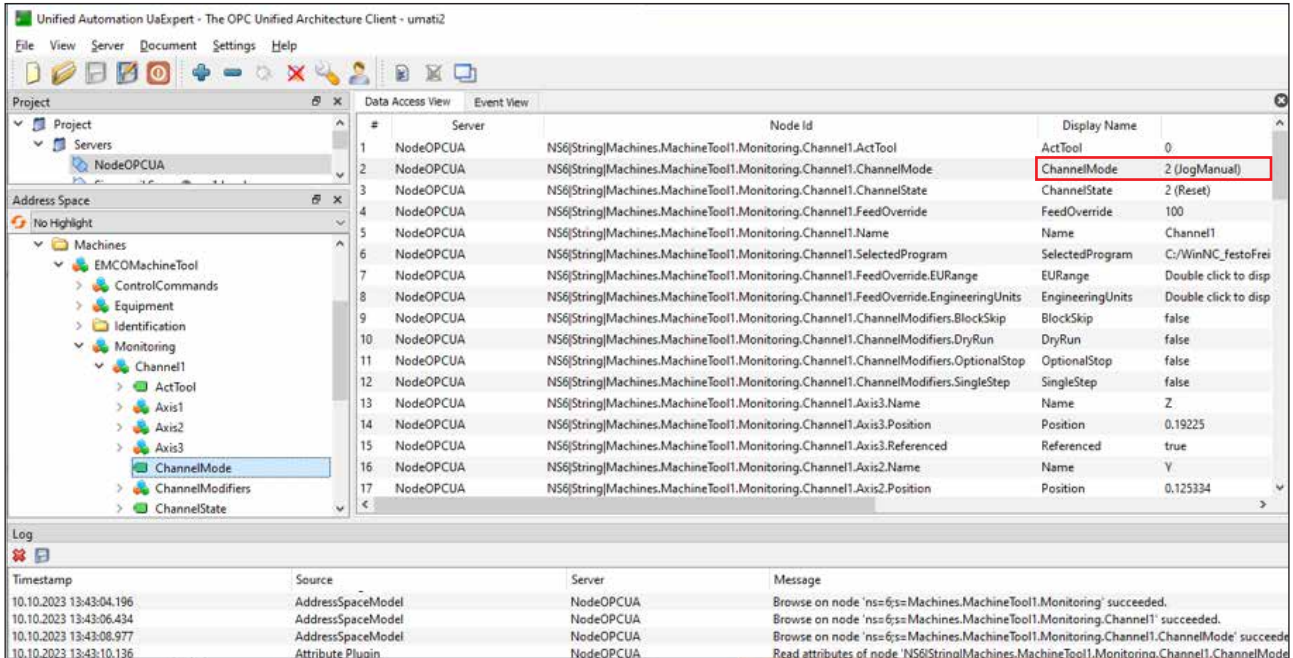
The dialog box 'Call OperationMode on CommandsObject' shows the following details:

Input Arguments			
Name	Value	DataType	Description
OperationMode	2	Int32	Operation mode as number (Automatic: 0, MdaMdi: 1, JogManual: 2, JogIncrement: 3, Reference: 6)

Output Arguments			
Name	Value	DataType	Description
Success	<input checked="" type="checkbox"/>	Boolean	Command sent successfully to control

Result
Succeeded

- Positive Rückmeldung, d.h. das Kommando wurde erfolgreich an die Steuerung versandt.
- Kontrolle unter EMCOMachineTool.Monitoring.Channel1.ChannelMode, ob das Kommando von der Steuerung ausgeführt wurde.



Dieses Produkt entstand in Kooperation mit dem CDP, Austrian Center for Digital Production GmbH, TU Wien.

Interface description OPC UA umati interface WinNC

The OPC UA umati interface WinNC is an umati-compatible OPC UA server for the network connection of a Concept Machine to external systems. Machine data can be read out via this interface. In addition, the machine can be controlled via commands and control-specific parameters can be set. This interface can be operated with the following CNC control types:

- EMCO WinNC for Sinumerik Operate T and M from version 1.20.0002
- EMCO WinNC for Fanuc31i T and M from version 1.16.0002
- EMCO WinNC for Heidenhain TNC640 from version 1.14.0002

The server consists of the following two services:

- EMCO Opcua Backend WinNC Service
- EMCO Opcua Frontend Service

The backend was developed as a connection between the controls and the frontend OPC UA server, which takes over the mapping between the request of the frontend service via HTTP to a special variable query or to a command for the respective WinNC control.

Basic documentation on umati and OPC UA can be found at <https://documentation.unified-automation.com> and [Machine Tools - Monitoring and Job Overview \(opcfoundation.org\)](https://www.opcfoundation.org/Machine-Tools-Monitoring-and-Job-Overview)

The server is based on the Companion Specification of the OPC Foundation

OPC 40501-1: Machine Tools - Monitoring and Job Overview mit *MachineTool Basic Server Profile* with the following facets:

- MachineTool Monitoring Server Facet
- MachineTool Tools Server Facet
- MachineTool Errors and Alerts Server Facet

Facet: "Profile dedicated to a specific feature that a Server or Client may require"

However, the BaseObjectType MachineToolType was extended to EMCOMachineToolType for the requirements of also being able to write variables or execute commands. This also defines additional variables that are not included in the umati scope but must be read as a response to commands.

The **MachineToolType** includes all relevant information about a machine tool and structures the interface as follows into the following mandatory components

- **Identification** (MachineToolIdentificationType)
- **Monitoring** (MonitoringType) -> ChannelMonitoringType
- **Notification** (NotificationType)
- **Production** (ProductionType):
 Under Production -> ActiveProgram the *ProductionActiveProgramType* has been extended as *EmcoProductionActiveProgramType* by the variable ActProgLine.
- **Equipment** -> Tools (ToolListType) -> Tool (ToolType)

The **EMCOMachineToolType** also contains the nodes:

- **PeripheralDevices** with the variables ClampingDeviceState and DoorState, which map the status of the clamping device or door
- **UserParameter:**
 There are 10 variables for each WinNC controller under Machines. MachineTool1.UserParameter, which can be written by an OPC UA client:
 $n=0..9$: Machines.MachineTool1.UserParameter n (*double*), Machines.MachineTool1.StringParameter n

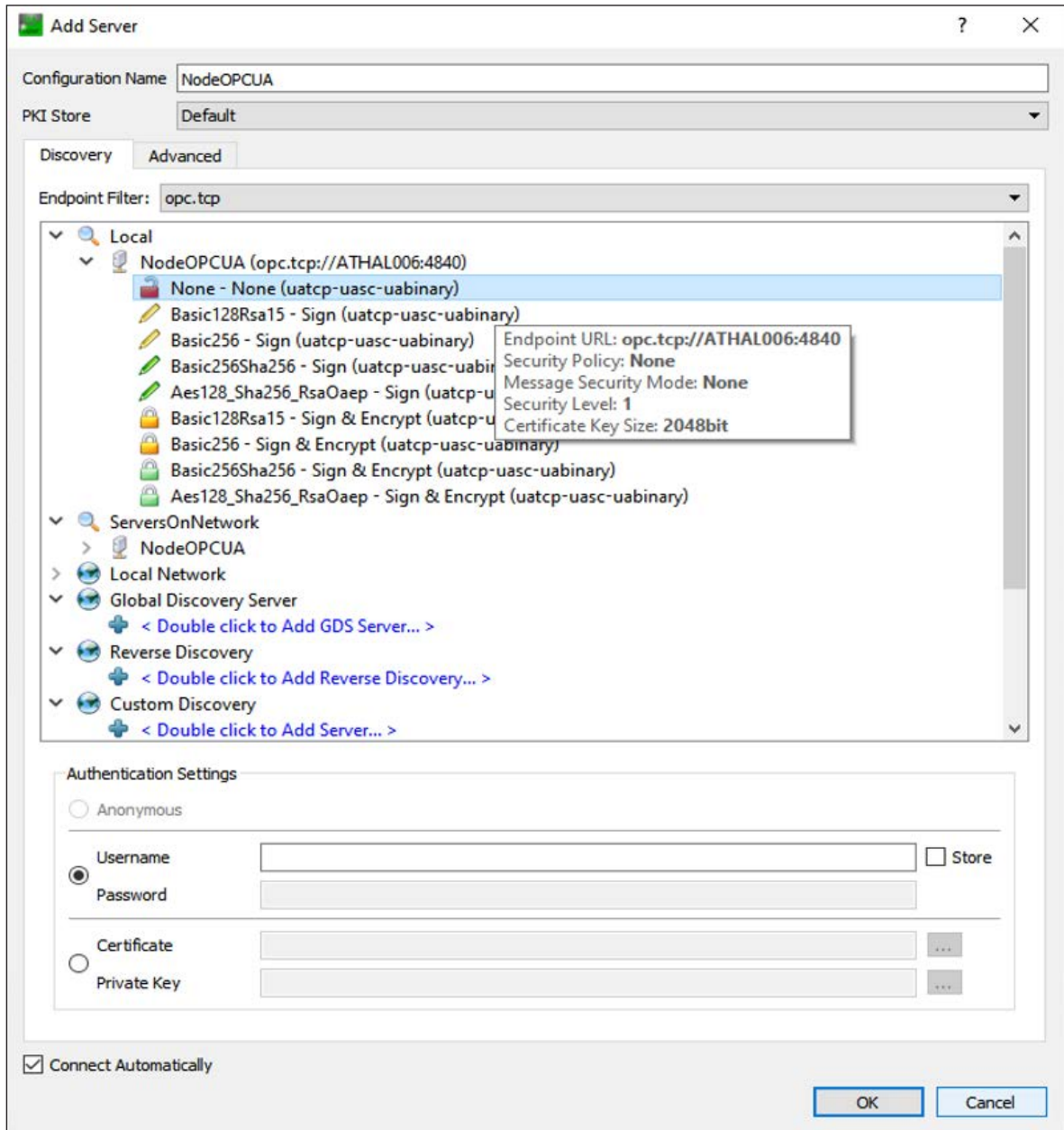
WinNC	Double-parameter	String-parameter
Sinumerik Operate	R0 - R9 (R-parameter)	_TXT[0] - _TXT[9]
Heidenhain TNC640	Q50 - Q59 (Q-parameter)	QS0 - QS9 (QS-Parameter)
Fanuc 31i	#500 - #509 (client-makro)	not available

- ControlCommands with the commands to the controller:
 The following commands are implemented as UAMethods with an argument and a return value. The result indicates whether the command was successfully sent to the controller.
 To check whether the command was also processed successfully, the corresponding variables under Machines.MachineTool1... can be read.

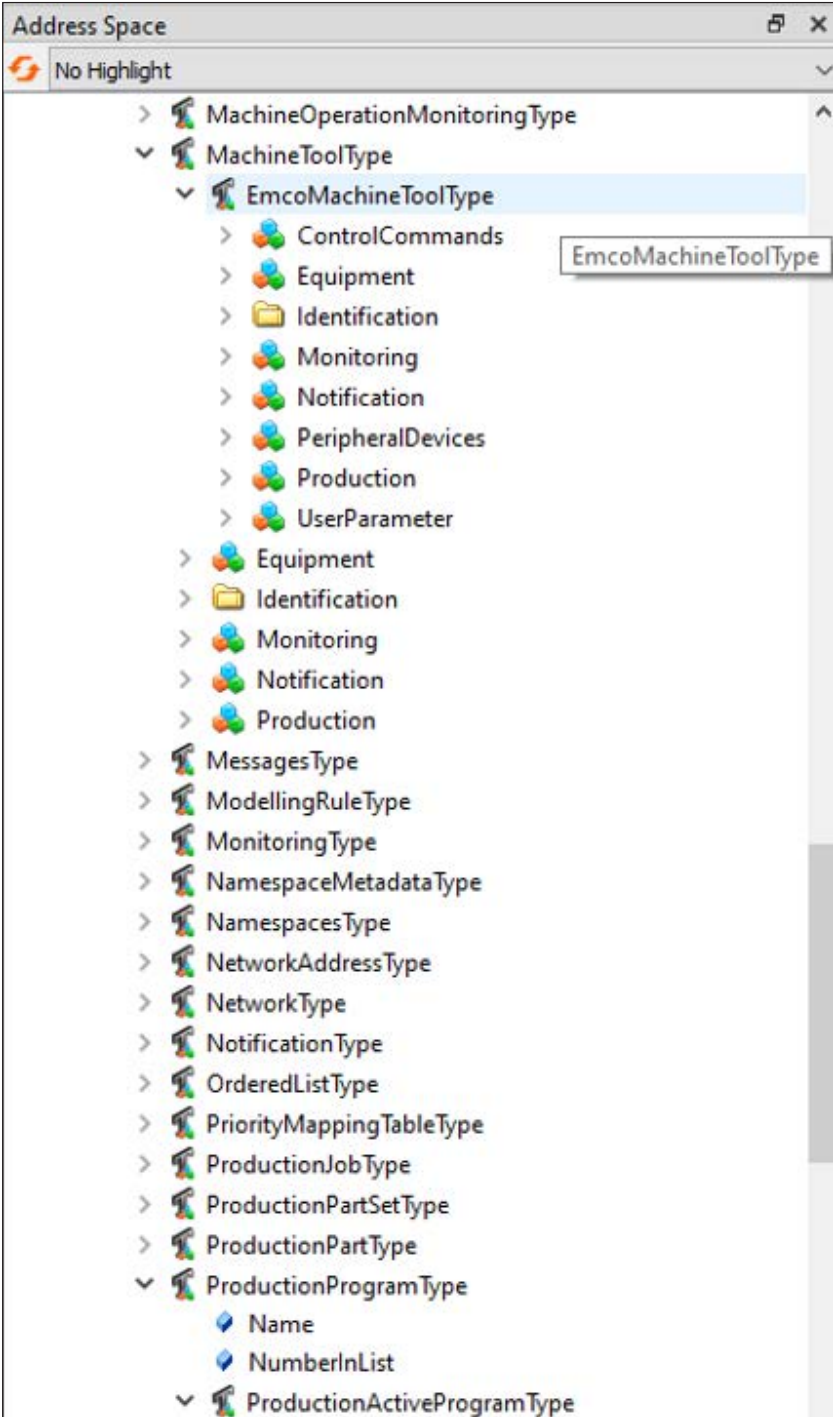
Command	Argument	Variable for testing
Clamping	0 (open) 1 (close)	PeripheralDevices.ClampingDeviceState
Door	0 (open) 1 (close) 2 (stop)	PeripheralDevices.DoorState
OperationMode (Change operation mode)	0 (Automatic) 1 (MdaMdi) 2 (JogManual) 3 (JogIncrement) 6 (Reference)	Monitoring.Channel1.ChannelMode
Reference (reference axes)	-1 (all linear and rotary axes), bit mask for individual axes, e.g. 5 for X/Z	Monitoring.Channel1.Axisn.Referenced
ProgramStart	1 (Start)	Monitoring.Channel1.ChannelState = 0 (Active)
ProgramStop	1 (Stop)	Monitoring.Channel1.ChannelState = 1 (Interrupted)
Reset	1 (Reset)	Monitoring.Channel1.ChannelState = 2 (Reset)
SelectProgram	complete path or relative to the NCFilePath of the controller e.g. C:/WinNC32/hmioperate.m/prg/MPF.DIR/TEST.MPF	Monitoring.Channel1.SelectedProgram
SetFeedOverride	Integer value from 0 to 120 (percentage)	Monitoring.Channel1.FeedOverride
SetSpeedOverride	Integer value from 50 to 120 (percentage)	Monitoring.Spindle1.Override
Tool	tool number	Monitoring.Channel1.ActTool

The following screenshots illustrate the available variables and commands using the free OPC UA client UAExpert.

The OPC UA server can be connected either with anonymous read-only access or with the following login credentials:
user: admin, password: pw1



The type definitions can be displayed in the address space in the UAExpert:



The commands and variables described above can be found in the Address Space under Root->Objects->Machines. The node IDs and values of the variables can be displayed in the Data Access View by moving them to this area.

The screenshot displays the OPC UA UMATI interface with the Data Access View table and the Address Space tree. The table lists various nodes with their IDs, servers, and values. The Address Space tree shows the hierarchy of objects, including Machines, EMCOMachineTool, and various control commands and equipment tools.

#	Server	Node Id	Display Name	Value
1	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.StacklightMode	StacklightMode	0 (Segmented)
2	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.Light0.IsPartOfBase	IsPartOfBase	false
3	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.Light0.NumberInList	NumberInList	0
4	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.Light0.SignalColor	SignalColor	1 (Red)
5	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.Light0.SignalMode	SignalMode	0 (Continuous)
6	OPC UA Server	NS6[String Machines.MachineTool1.Equipment.Tools.NodeVersion	NodeVersion	2023-10-24T12:36:39.236
7	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.BlockSkip	BlockSkip	false
8	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.DryRun	DryRun	false
9	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.OptionalStop	OptionalStop	false
10	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.SingleStep	SingleStep	false
11	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.StacklightMode	StacklightMode	0 (Segmented)
12	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.MachineTool.OperationMode	OperationMode	0 (Manual)
13	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelMode	ChannelMode	2 (JogManual)
14	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelState	ChannelState	2 (Reset)
15	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.FeedOverride	FeedOverride	55
16	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.Name	Name	Channel1
17	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.FeedOverride.EURange	EURange	Double click to display value
18	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.FeedOverride.EngineeringUnits	EngineeringUnits	Double click to display value
19	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.BlockSkip	BlockSkip	false
20	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.DryRun	DryRun	false
21	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.OptionalStop	OptionalStop	false
22	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.SingleStep	SingleStep	false
23	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.Light0.IsPartOfBase	IsPartOfBase	false
24	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.Light0.NumberInList	NumberInList	0
25	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.Light0.SignalColor	SignalColor	1 (Red)
26	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.Light0.SignalMode	SignalMode	0 (Continuous)
27	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ActTool	ActTool	0
28	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelMode	ChannelMode	2 (JogManual)
29	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelState	ChannelState	2 (Reset)
30	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.FeedOverride	FeedOverride	55
31	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.Name	Name	Channel1
32	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.SelectedProgram	SelectedProgram	
33	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.FeedOverride.EURange	EURange	Double click to display value
34	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.FeedOverride.EngineeringUnits	EngineeringUnits	Double click to display value
35	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.BlockSkip	BlockSkip	false
36	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.DryRun	DryRun	false
37	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.OptionalStop	OptionalStop	false
38	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.SingleStep	SingleStep	false
39	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.Axis3.Name	Name	Z
40	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.Axis3.Position	Position	0.335
41	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.Axis3.Referenced	Referenced	true
42	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.Axis2.Name	Name	
43	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.Axis2.Position	Position	0

A value can be set in the Data Access View under Value if the variable is writable, otherwise an error is displayed in the log window. Only the UserParameter and StringParameter can be written.

The screenshot shows the 'Data Access View' window in UaExpert. It displays a table with columns for '#', 'Server', 'Node Id', and 'Display Name'. The table lists various nodes from the OPC UA address space, including monitoring channels and user/string parameters. The 'Log' window at the bottom shows a series of messages, including successful attribute reads and writes for 'UserParameter.Value3'.

#	Server	Node Id	Display Name	Value
11	NodeOPCUA	NS6[String]Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.OptionalStop	OptionalStop	false
12	NodeOPCUA	NS6[String]Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.SingleStep	SingleStep	false
13	NodeOPCUA	NS6[String]Machines.MachineTool1.Monitoring.Channel1.Axis3.Name	Name	Z
14	NodeOPCUA	NS6[String]Machines.MachineTool1.Monitoring.Channel1.Axis3.Position	Position	0.19225
15	NodeOPCUA	NS6[String]Machines.MachineTool1.Monitoring.Channel1.Axis3.Referenced	Referenced	true
16	NodeOPCUA	NS6[String]Machines.MachineTool1.Monitoring.Channel1.Axis2.Name	Name	Y
17	NodeOPCUA	NS6[String]Machines.MachineTool1.Monitoring.Channel1.Axis2.Position	Position	0.125334
18	NodeOPCUA	NS6[String]Machines.MachineTool1.Monitoring.Channel1.Axis2.Referenced	Referenced	true
19	NodeOPCUA	NS6[String]Machines.MachineTool1.Monitoring.Channel1.Axis1.Name	Name	X
20	NodeOPCUA	NS6[String]Machines.MachineTool1.Monitoring.Channel1.Axis1.Position	Position	0.288093
21	NodeOPCUA	NS6[String]Machines.MachineTool1.Monitoring.Channel1.Axis1.Referenced	Referenced	true
22	NodeOPCUA	NS6[String]Machines.MachineTool1.Monitoring.Channel1.Axis1.Position.EngineeringUnits	EngineeringUnits	Double cl
23	NodeOPCUA	NS6[String]Machines.MachineTool1.Monitoring.Channel1.Axis2.Position.EngineeringUnits	EngineeringUnits	Double cl
24	NodeOPCUA	NS6[String]Machines.MachineTool1.Monitoring.Channel1.Axis3.Position.EngineeringUnits	EngineeringUnits	Double cl
25	NodeOPCUA	NS6[String]Machines.MachineTool1.StringParameter.Value0	StringParameter0	
26	NodeOPCUA	NS6[String]Machines.MachineTool1.StringParameter.Value1	StringParameter1	
27	NodeOPCUA	NS6[String]Machines.MachineTool1.StringParameter.Value2	StringParameter2	
28	NodeOPCUA	NS6[String]Machines.MachineTool1.StringParameter.Value3	StringParameter3	test
29	NodeOPCUA	NS6[String]Machines.MachineTool1.StringParameter.Value4	StringParameter4	
30	NodeOPCUA	NS6[String]Machines.MachineTool1.StringParameter.Value5	StringParameter5	
31	NodeOPCUA	NS6[String]Machines.MachineTool1.StringParameter.Value6	StringParameter6	
32	NodeOPCUA	NS6[String]Machines.MachineTool1.StringParameter.Value7	StringParameter7	
33	NodeOPCUA	NS6[String]Machines.MachineTool1.StringParameter.Value8	StringParameter8	
34	NodeOPCUA	NS6[String]Machines.MachineTool1.StringParameter.Value9	StringParameter9	
35	NodeOPCUA	NS6[String]Machines.MachineTool1.UserParameter.Value0	UserParameter0	0
36	NodeOPCUA	NS6[String]Machines.MachineTool1.UserParameter.Value1	UserParameter1	0
37	NodeOPCUA	NS6[String]Machines.MachineTool1.UserParameter.Value2	UserParameter2	0.78965
38	NodeOPCUA	NS6[String]Machines.MachineTool1.UserParameter.Value3	UserParameter3	23.2
39	NodeOPCUA	NS6[String]Machines.MachineTool1.UserParameter.Value4	UserParameter4	0
40	NodeOPCUA	NS6[String]Machines.MachineTool1.UserParameter.Value5	UserParameter5	0
41	NodeOPCUA	NS6[String]Machines.MachineTool1.UserParameter.Value6	UserParameter6	5.5555
42	NodeOPCUA	NS6[String]Machines.MachineTool1.UserParameter.Value7	UserParameter7	0
43	NodeOPCUA	NS6[String]Machines.MachineTool1.UserParameter.Value8	UserParameter8	0
44	NodeOPCUA	NS6[String]Machines.MachineTool1.UserParameter.Value9	UserParameter9	0

The screenshot shows the 'EASY2CONTROL' interface. A table displays 'R variables' with columns for R 0 through R 16. The values for R 2, R 3, and R 6 are highlighted in yellow. The R 3 value is 23.2. The interface also includes a search bar and a numeric keypad.

R 0	R 1	R 2	R 3	R 4	R 5	R 6	R 7	R 8	R 9	R 10	R 11	R 12	R 13	R 14	R 15	R 16
0	0	0	23.2	0	0	5.5555	0	0	0	0	0	0	0	0	0	0
20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Alarms from the controller are sent cyclically and displayed in the EventView of the UAExpert. To do this, the AlarmCondition node must be added under Configuration.

WinNC for Sinumerik Operate

17190 ↓ Block 4 illegal T number TEST

NC/ZUGPROBE_DECCA/4MM_M6 **emco**

active OPCUA

Workpiece	Position [mm]	Dist-to-go [mm]	T,F,S
∅ X	103.000	0.000	T
Z	46.720	0.000	F
			R0.000 D1
			0.000 mm/min 100%
S1	0		100%
Master	0		100%

G54

NC/ZUGPROBE_DECCA/4MM_M6

T="TEST"

Unified Automation UaExpert - The OPC Unified Architecture Client - emco_umat2

File View Server Document Settings Help

Project: OPC UA Server, anonymEmcoUmati

Address Space: Root, Objects, Alarms&Conditions, AlarmCondition

Configuration: Server/Object, OPC UA Server / AlarmCondition

Events: Alarms, Event History

A	C	Time	Severity	Server/Object	SourceName	Message	EventType	Active
▲	▲	16:36:42.900	750	OPC UA Server ...	S:Messages	Block 4 illegal T number TEST	AlertType	Active
▲	▲	16:36:42.901	750	OPC UA Server ...	S:Messages	X+ Software limit overtravel	AlertType	Active
▲	▲	16:36:43.916	750	OPC UA Server ...	S:Messages	Block 4 illegal T number TEST	AlertType	Active
▲	▲	16:36:43.917	750	OPC UA Server ...	S:Messages	X+ Software limit overtravel	AlertType	Active
▲	▲	16:36:44.924	750	OPC UA Server ...	S:Messages	Block 4 illegal T number TEST	AlertType	Active
▲	▲	16:36:44.925	750	OPC UA Server ...	S:Messages	X+ Software limit overtravel	AlertType	Active
▲	▲	16:36:45.932	750	OPC UA Server ...	S:Messages	Block 4 illegal T number TEST	AlertType	Active
▲	▲	16:36:45.933	750	OPC UA Server ...	S:Messages	X+ Software limit overtravel	AlertType	Active

Details:

Name	Value
ConditionId	NodeId
NamespaceIndex	1
IdentifierType	Numeric
Identifier	1032
AckedState/Id	False
ActiveState	"", "Active"
ActiveState/Id	True
BranchId	NodeId
NamespaceIndex	0
IdentifierType	Numeric
Identifier	0

Log:

Timestamp	Source	Server	Message
24.10.2023 16:35:01.879	Event Plugin	OPC UA Server	SelectClause [1]: badNoMatch
24.10.2023 16:35:01.879	Event Plugin	OPC UA Server	SelectClause [18]: badNothingToDo
24.10.2023 16:35:01.879	Event Plugin	OPC UA Server	Calling ConditionRefresh to get current conditions
24.10.2023 16:35:01.885	Event Plugin	OPC UA Server	Call ConditionRefresh returned Good for ServerId OPC UA Server.
24.10.2023 16:36:29.111	AddressSpaceModel	OPC UA Server	Browse on node 'ns=4;i=1001' succeeded.
24.10.2023 16:36:30.257	AddressSpaceModel	OPC UA Server	Browse on node 'ns=6;s=Machines.MachineTool1' succeeded.
24.10.2023 16:36:32.519	AddressSpaceModel	OPC UA Server	Browse on node 'ns=6;i=1001' succeeded.
24.10.2023 16:36:33.528	AddressSpaceModel	OPC UA Server	Browse on node 'ns=6;i=1011' succeeded.
24.10.2023 16:36:34.458	AddressSpaceModel	OPC UA Server	Browse on node 'ns=6;i=1008' succeeded.
24.10.2023 16:36:36.939	AddressSpaceModel	OPC UA Server	Browse on node 'ns=1;i=1032' succeeded.
24.10.2023 16:36:40.417	Attribute Plugin	OPC UA Server	Read attributes of node 'NS1[Numeric]1032' succeeded [ret = Good].
24.10.2023 16:36:40.421	Reference Plugin	OPC UA Server	Browse succeeded.

Here is another example to check whether the controller has implemented a command correctly:

- Calling the OperationMode command with the argument 2 (Jog-Manual):

#	Server	Node Id	Display Name	Value	DataType
1	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.ActTool	ActTool	0	UInt32
2	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.ChannelMode	ChannelMode	0 (Automatic)	Int32
3	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.ChannelState	ChannelState	2 (Reset)	Int32
4	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.FeedOverride	FeedOverride	100	Double
5	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Name	Name	Channel1	String
6	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.SelectedProgram	SelectedProgram	C:/WinNC_festoFreigabe/HM/operate.M/PRG/MPF.DIR/...	String
7	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.FeedOverride.EURange	EURange	Double click to display value	ExtensionOf
8	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.FeedOverride.EngineeringUnits	EngineeringUnits	Double click to display value	ExtensionOf
9	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.BlockSkip	BlockSkip	false	Boolean
10	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.DryRun	DryRun	false	Boolean
11	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.OptionalStop	OptionalStop	false	Boolean
12	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.SingleStep	SingleStep	false	Boolean
13	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis3.Name	Name	Z	String
14	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis3.Position	Position	0.19225	Double
15	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis3.Referenced	Referenced	true	Boolean
16	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis2.Name	Name	Y	String
17	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis2.Position	Position	0.125334	Double
18	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis2.Referenced	Referenced	true	Boolean
19	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis1.Name	Name	X	String
20	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis1.Position	Position	0.288093	Double
21	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis1.Referenced	Referenced	true	Boolean
22	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis1.Position.EngineeringUnits	EngineeringUnits	Double click to display value	ExtensionOf
23	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis2.Position.EngineeringUnits	EngineeringUnits	Double click to display value	ExtensionOf
24	NodeOPCUA	NS5(String)Machines.MachineTool1.Monitoring.Channel1.Axis3.Position.EngineeringUnits	EngineeringUnits	Double click to display value	ExtensionOf
25	NodeOPCUA	NS5(String)Machines.MachineTool1.StringParameter.Value0	StringParameter0		String
26	NodeOPCUA	NS5(String)Machines.MachineTool1.StringParameter.Value1	StringParameter1		String
27	NodeOPCUA	NS5(String)Machines.MachineTool1.StringParameter.Value2	StringParameter2		String
28	NodeOPCUA	NS5(String)Machines.MachineTool1.StringParameter.Value3	StringParameter3		String
29	NodeOPCUA	NS5(String)Machines.MachineTool1.StringParameter.Value4	StringParameter4		String
30	NodeOPCUA	NS5(String)Machines.MachineTool1.StringParameter.Value5	StringParameter5		String
31	NodeOPCUA	NS5(String)Machines.MachineTool1.StringParameter.Value6	StringParameter6		String
32	NodeOPCUA	NS5(String)Machines.MachineTool1.StringParameter.Value7	StringParameter7		String
33	NodeOPCUA	NS5(String)Machines.MachineTool1.StringParameter.Value8	StringParameter8		String
34	NodeOPCUA	NS5(String)Machines.MachineTool1.StringParameter.Value9	StringParameter9		String
35	NodeOPCUA	NS5(String)Machines.MachineTool1.UserParameter.Value0	UserParameter0	0	Double
36	NodeOPCUA	NS5(String)Machines.MachineTool1.UserParameter.Value1	UserParameter1	0	Double
37	NodeOPCUA	NS5(String)Machines.MachineTool1.UserParameter.Value2	UserParameter2	0.78965	Double
38	NodeOPCUA	NS5(String)Machines.MachineTool1.UserParameter.Value3	UserParameter3	23.2	Double

Call OperationMode on CommandsObject

Input Arguments

Name	Value	DataType	Description
OperationMode	2	Int32	Operation mode as number (Automatic: 0, MdaMdi: 1, JogManual: 2, JogIncrement: 3, Reference: 6)

Output Arguments

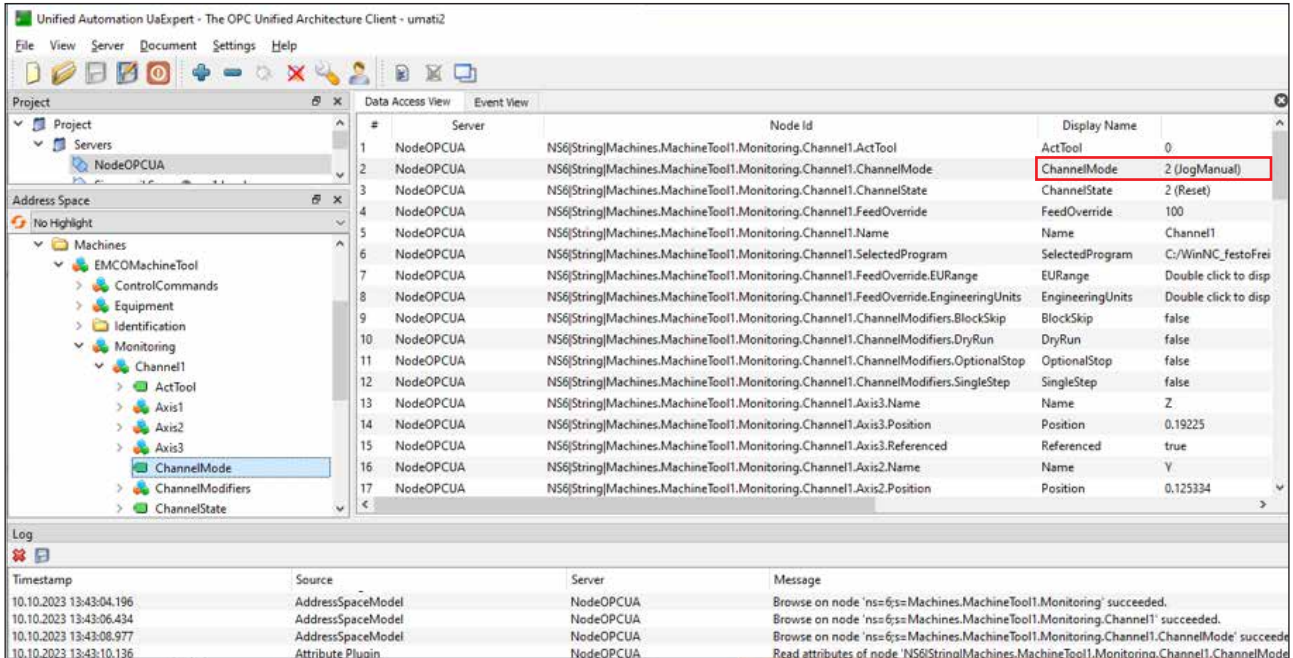
Name	Value	DataType	Description
Success	<input checked="" type="checkbox"/>	Boolean	Command sent successfully to control

Result

Succeeded

Call Close

- Positive feedback, i.e. the command was successfully sent to the control unit.
- Check EMCOMachineTool.Monitoring.Channel1.ChannelMode whether the command was executed by the control unit.



This product was developed in co-operation with the CDP, Austrian Center for Digital Production GmbH, Technical University of Vienna.

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