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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) 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 *EmcoProductionActiveProgram-Type* 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 NCFilePath 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.

Add Server		r	×
Configuration Name	NodeOPCUA		
KI Store	Default		•
Discovery Adv	anced		
Endpoint Filter: o	pc.tcp		•
 ✓ Q. Local ✓ Q. Local ✓ Q. Nod ✓ Q. ServersC > Q. Nod ✓ Q. ServersC > Q. Nod ✓ Q. ServersC > Q. Nod ✓ Q. ServersC ✓ Serv	eOPCUA (opc.tcp://ATHAL006:4840) None - None (uatcp-uasc-uabinary) Basic128Rsa15 - Sign (uatcp-uasc-uabinary) Basic256Sha256 - Sign (uatcp-uasc-uabinary) Basic256Sha256 - Sign (uatcp-uasc-uabinary) Basic128Rsa15 - Sign & Encrypt (uatcp-uasc-uabinary) Basic128Rsa15 - Sign & Encrypt (uatcp-uasc-uabinary) Basic256Sha256 - Sign & Encrypt (uatcp-uasc-uabinary) Discovery Server puble click to Add GDS Server > Discovery buble click to Add Reverse Discovery > Discovery buble click to Add Server > Settings s		
Certificate			
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Im Address Space im UAExpert können die Typdefinitionen angezeigt werden:

Ad	dress Space	:
9	No Highligh	t
	>	🐔 MachineOperationMonitoringType
	~	🐔 MachineToolType
		Y 🐔 EmcoMachineToolType
		> 👶 ControlCommands
		> 🖂 Equipment
		> 🚞 Identification
		> 🖂 Monitoring
		> 💑 Notification
		> 💑 PeripheralDevices
		> 💑 Production
		> 💑 UserParameter
		> 💑 Equipment
		> 🛅 Identification
		> 💑 Monitoring
		> 💑 Notification
		> 💑 Production
	>	1 MessagesType
	>	🐒 ModellingRuleType
	>	1 Monitoring Type
	>	🐒 NamespaceMetadataType
	>	🐔 NamespacesType
	>	1 NetworkAddressType
	>	1 NetworkType
	>	🐒 Notification Type
	>	1 OrderedListType
	>	PriorityMappingTableType
	>	T ProductionJobType
	>	1 ProductionPartSetType
	>	T ProductionPartType
	~	🐔 ProductionProgramType
		Name
		NumberInList
		In the second

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.

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iject Ø	× Da	ata Access View Event Vie	bw l		
Droject	^ 4	Server	Node Id	Display Name	Value
✓	1	OPC UA Server	NS6 String Machines.MachineTool1.Monitoring.Stacklight.StacklightMode	StacklightMode	0 (Segmented)
📎 OPC UA Server	2	OPC UA Server	NS6 String Machines.MachineTool1.Monitoring.Stacklight.Light0.lsPartOfBase	IsPartOfBase	false
🗞 anonymEmcoUmati	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)
Data Arcare View	5	OPC UA Server	NS6[String]Machines.MachineTool1.Monitoring.Stacklight.Light0.SignalMode	SignalMode	0 (Continuous)
dress Space 🗗	× 6	OPC UA Server	NS6[String]Machines.MachineTool1.Equipment.Tools.NodeVersion	NodeVersion	2023-10-24T12:36:39.236
No Highlight	~ 7	OPC UA Server	NS6[String]Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.BlockSkip	BlockSkip	false
Root	^ 8	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.DryRun	DryRun	false
C Objects	9	OPC UA Server	NS6[String Machines-MachineTool1.Monitoring.Channel1.ChannelModifiers.OptionalStop	OptionalStop	false
> 🛄 Aliases	10	OPC UA Server	NS6 String Machines-MachineTool1.Monitoring.Channel1.ChannelModifiers.SingleStep	SingleStep	false
> 💑 DeviceSet	11	OPC UA Server	NS6 String Machines-MachineTool1.Monitoring.Stacklight.StacklightMode	StacklightMode	0 (Segmented)
> CeviceTopology	12	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.MachineTool.OperationMode	OperationMode	0 (Manual)
InternalFunctionNodes	13	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelMode	ChannelMode	2 (JogManual)
Locations	14	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.ChannelState	ChannelState	2 (Reset)
With the second se	15	OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Channel1.FeedOverride	FeedOverride	55
ControlCommente	16	OPC UA Server	NS6[String Machines-MachineTool1.Monitoring-Channel1.Name	Name	Channel1
Controicommands	17	OPC UA Server	NS6IString Machines.MachineTool1.Monitoring.Channel1.FeedOverride.EURange	EURange	Double click to display value
Commandsobject	18	OPC UA Server	NS6(String)Machines.MachineTool1.Monitoring.Channel1.FeedOverride.EngineeringUnits	EngineeringUnits	Double click to display value
> 19 Door	19	OPC UA Server	NS6IString Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.BlockSkip	BlockSkip	false
> OperationMode	20	OPC UA Server	NS6IString Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.DrvRun	DryRun	false
> ProgramStart	21	OPC LIA Server	NS6IStringIMachines MachineTool1 Monitoring Channel1 ChannelModifiers OntionalSton	OntionalSton	false
> ··· ProgramStop	22	OPC UA Server	NS6IString Machines MachineTool1 Monitoring Channel1 ChannelModifiers SingleSten	SingleSten	false
> ·· Reference	23	OPC UA Server	NS6(String Machines MachineTool1 Monitoring Stacklight Light0 IsPartOfRase	IsPartOfRace	false
> 👒 Reset	24	OPC UA Server	NS6(String Machines MachineTool1 Monitoring Stacklight Light0 NumberInl ist	Numberini ist	0
> SelectProgram	25	OPC UA Server	NS6[String]Machine: MachineTool1 Monitoring Stacklight Light0 SignalColor	SignalColor	1 (Red)
> 😔 SetFeedOverride	26	OPC UA Server	NS6(String)Machines MachineTool1 Monitoring Stacklight Light0 SignalColor	SignalMode	0 (Continuour)
> 🧐 SetSpeedOverride	27	OPC UA Server	NS6/String/Machines/MachineTool1 Monitoring/Stackinghtergino.signali/oue	ActTool	0
> 🔹 Tool	29	OPC UA Server	NS6[String]Machines MachineTool1 Monitoring Channell ChannelMode	ChappelMode	2 (looManual)
💙 臱 Equipment	20	OPC UA Server	NS6(String)Machines MachineTool1 Monitoring Channel ChannelState	ChannelState	2 (Peret)
🗸 💑 Tools	20	OPC UA Server	NS6[String]Machines MachineTool1 Monitoring Channel1 FeedOverride	FeedOverride	55
NodeVersion	31	OPC UA Server	NS6[String]Machines MachineTool1 Monitoring Channel1 Name	Name	Channell
> 💑 Tool1	22	OPC UA Server	NS6(String)Machines MachineTool1 Monitoring Channel1 SelectedProgram	SelectedProgram	Chamler
> 💑 Tool2	22	OPC UA Server	NS6[String]Machines MachineTool1 Monitoring Channel1 Sector rogram	EliRance	Double click to direlay value
> 🤤 Identification	2.4	OPC IIA Server	NS6/String/Machines Machine Tool 1 Monitoring Channel 1 Feed Override Engineering Inite	EngineeringUnitz	Double click to display value
> 🚜 Monitoring	25	OPC IIA Server	NS6/String/Machines MachineTool1 Monitoring Channel1 ChannelModifiers BlockSkin	BlockSkin	false
Notification	35	OPC IIA Server	NS6/String/Machines/MachineTool1 Monitoring Channel1 ChannelModifiers Do Run	DruRun	false
 PeripheralDevices Resoluction 	27	OPC LIA Server	NS6/String/Machines MachineTool1 Monitoring Channel1 ChannelModifiers OntionalSton	OntionalSton	false
 Production ActiveProgram 	20	OPC UA Server	NS6(String)Machines Machine Tool LMonitoring Channel I ChannelModifiers SingleSter	SingleStep	falce
ActiveProgram	20	OPC UA Server	NS6(String)Machiner Machine Tool 1 Monitoring Channel 1 Avir? Name	Name	7
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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.

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Y 🗊 Project	^ #	Server		Node Id	Display Name	
✓	11	NodeOPCUA	NS6 String Machines.MachineTool1	Monitoring Channel1. ChannelModifiers. OptionalStop	OptionalStop	false
NodeOPCUA	12	NodeOPCUA	NS6 String Machines.MachineTool1	Monitoring.Channel1.ChannelModifiers.SingleStep	SingleStep	false
SinumenkServer@ncu1.local	13	NodeOPCUA	NS6[String Machines.MachineTool1	.Monitoring.Channel1.Axis3.Name	Name	z
🗞 NodeOPCUA@193.46.5.197	14	NodeOPCUA	NS6 String Machines.MachineTool1	Monitoring.Channel1.Axis3.Position	Position	0.19225
Y 🗇 Documents	15	NodeOPCUA	NS6 String Machines.MachineTool1	Monitoring.Channel1.Axis3.Referenced	Referenced	true
Data Access View	√ 16	NodeOPCUA	NS6 String Machines.MachineTool1	Monitoring.Channel1.Axis2.Name	Name	V.
Address Space	A × 17	NodeOPCUA	NS6IStringlMachines.MachineTool1	Monitoring Channell Axis2 Position	Position	0.125334
Address space	18	NodeOPCUA	NS6IStringIMachines.MachineTool1	Monitoring.Channel1.Axis2.Referenced	Referenced	true
No Highight	19	NodeOPCUA	NSRString Machines_MachineTool1	Monitoring Channell Axis1.Name	Name	X
V Name	20	NoteOPCUA	NSSIString Machines_MachineTool1	Monitoring Channell Axis1 Position	Position	0.288093
2 SelectedProgram	21	NoteOPCUA	MCGString/Machines MachineTool1	Monitoring Channell Avis Referenced	Paterenced	true
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> 💑 Notification	24	NodeOPCUA	NS6[String]Machines.Machine.loo11	.Monitoring.Channel1.Axis3.Position.EngineeringUnits	EngineeringUnits	Double c
PeripheralDevices	25	NodeOPCUA	N56 String Machines.MachineTool1.	.StringParameter.Value0	StringParameter0	
> 💑 Production	26	NodeOPCUA	N56 String Machines.MachineTool1.	.StringParameter.Value1	StringParameter1	
👻 🚜 UserParameter	27	NodeOPCUA	NS6 String Machines.MachineTool1	.StringParameter.Value2	StringParameter2	
> C StringParameter0	28	NodeOPCUA	NS6[String]Machines.MachineTool1.StringParameter.Value3		StringParameter3	test
> 😓 StringParameter1	29	NodeOPCUA	NS6jString[Machines.MachineTool1	.StringParameter.Value4	StringParameter4	
> G StringParameter2	30	NodeOPCUA	NS6 String Machines.MachineTool1	.StringParameter.Value5	StringParameter5	
> StringParameters	31	NodeOPCUA	NS6[String]Machines.MachineTool1	.StringParameter.Value6	StringParameter6	
> 💶 StringParameter4	32	NodeOPCUA	NS6[String Machines.MachineTool1	.StringParameter.Value7	StringParameter7	
> 😅 StringParameter>	33	NodeOPCUA	NS6(String Machines.MachineTool1	StringParameter.Value8	StringParameter8	
StringParameter6	34	NodeOPCUA	NS6(String)Machines.MachineTool1	.StringParameter.Value9	StringParameter9	
> 🙂 StringParameter7	35	NodeOPCUA	NS6IStringIMachines.MachineTool1	UserParameter.Value0	UserParameter0	0
StringParameter8	36	NodeOPCUA	NS6IStrinolMachines.MachineTool1	UserParameter, Value1	UserParameter]	0
StringParameter9	37	NodeOPCUA	NGSIString Machines_MachineTool]	UneParameter Value?	LicerParameter?	0.78965
> 🙂 UserParameter0	38	NedeOPCUA	MSSIString Machines MachineTool1	UseDaramater Value3	UserParameter?	
> 🙂 UserParameter1	30	NodeoPCUA	All String Machiner Machine Tool	UsePerenter Values	UserDaramaterd	0
> 🔲 UserParameter2	35	NodeoPCUA	NS0jstringjwachines.Machine.Taoli	UserParameter.varues	UserParameters	0
> 🛄 UserParameter3	40	NodeOPCOA	Notistring[Machines.machine.com	UserParameter.ValueD	UserParameters	0
> 💶 UserParameter4	41	NodeOPCUA	NS6[String[Machines.Machine1001].	.UserParameter.Valuet	UserParametero	5,5555
VserParameter5	42	NodeOPCUA	NS6jString Machines.MachineTool1.	.UserParameter.Value7	UserParameter7	0
> 📒 UserParameter6	43	NodeOPCUA	NS6 String Machines.MachineTool1.	.UserParameter.Value3	UserParameter8	0
> 💷 UserParameter7	44	NodeOPCUA	NS6 String Machines.MachineTool1.	.UserParameter.Value9	UserParameter9	0
> 💷 UserParameter8	v					
Log						
# 🖯						
Timestamn	Source		Server	Message		
11.10.2023 07:51:22.438	AddressSpaceMr	odel	NodeOPCUA@193.46.5.197	Browse on node 'ns=6;s=Machines.MachineTool1	Equipment' succeeded	1
11.10.2023 07:51:32.597	AddressSpaceMe	odel	NodeOPCUA	Browse on node 'ns=fcs=Machines.MachineTool1.	UserParameter' succee	ided.
11.10.2023 07:51:39.883	AddressSpaceMo	odel	NodeOPCUA	Browse on node 'ns=6;s=Machines.MachineTool1.	StringParameter.Value?	9' succeeded
11.10.2023 07:51:45.057	Attribute Plugin		NodeOPCUA	Read attributes of node 'NS6 String Machines.Mac	hineTool1.UserParamet	ter.Value1' si
11.10.2023 07:52:17.741	DA Plugin		NodeOPCUA	Write to node "NSRString[Machines MachineTool"	UserParameter, Values	succeeded
11.10.2023 07:52:49.931	DA Plugin		NodeOPCUA	Write to node 'NS6IString Machines.MachineTool'	UserParameter, Value3	succeeded
11.10.2023 07:52:56.474	Attribute Plugin		NodeOPCUA	Read attributes of node 'NS6/String Machines.Mac	chineTool1.UserParame	ter.Value3' si
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R 3	23.2	R 23	0	R 43	0				
R 4	0	R 24	0	R 44	0				
R 5	0	R 25	0	R 45	0				
R 6	5.5555	R 26	0	R 46	0		5	7 60 AQ	7 8 9
R 7	0	R 27	0	R 47	0				4 5 6
R 8	0	R 28	0	R 48	0	9			
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R 10	0	R 30	0	R 50	0		100 1		
R 11	0	R 31	0	R 51	0				
R 12	0	R 32	0	R 52	0				
R 13	0	R 33	0	R 53	0				
R 14	0	R 34	0	R 54	0	Search			
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R 16	0	R 36	0	R 56	0				
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Tool	Tool OEM	Tool 🔫 Ma	aga- Worl	t R User	ole	SD Setting			ні 2, Ц. — .

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

WinNC for Sinumerik Operate							
Image: Markov M							
NC/ZUGPROBE	_DECCA/4MM_M6			emco			
🔶 active	OPCUA						
Workpiece	Position [mm]	Dist-to-g	jo [mm]	T,F,S			
ø X	103.000		0.000	т			
Z	46.720		0.000	R0.000	D1		
				F 0.000			
				0.000 mm/min	100%		
				S1 · 0	X		
				Master 0	100%		
⊡ G54							
NC/ZUGPROBE	_DECCA/4MM_M6						
T="TEST"					-		





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

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

Unified Automation UaExpert - The OPC Unified A	Architecture C	lient - umati2	en Arch en en en er	15875875		2-33234343434343434343434343434343434343	
File View Server Document Settings Help	p						
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Project	8 × 1	Data Access View Event Vie	54				(
✓ ♬ Project		# Server		Node Id	Display Name	Value	Dataty *
✓	1	NodeOPCUA	NS6IStringlMachines.MachineToo	II.Monitoring.Channel1.ActTool	ActTool	0	UInt32
NodeOPCUA	2	NodeOPCUA	NS6IString Machines_MachineToo	II.Monitoring.Channel1.ChannelMode	ChannelMode	0 (Automatic)	Int32
SinumerikServer@ncu1.local	3	NodeOPCUA	NS6[String[Machines_MachineToo	11.Monitoring Channel1.ChannelState	ChannelState	2 (Reset)	int32
Y 🗾 Documents	4	NodeOPCUA	NS6[String]Machines.MachineToo	II.Monitoring.Channel1.FeedOverride	FeedOverride	100	Double
Data Access View	5	NodeOPCUA	NS6[String]Machines.MachineToo	II.Monitoring.Channel1.Name	Name	Channel1	String
🗊 Event View	6	NodeOPCUA	NS6IString/Machines_MachineTop	II. Monitoring, Changel 1. Selected Program	SelectedProgram	C:/WinNC festoFreigabe/HMIoperate.M/PRG/MPF.D/R/	String
		NodeOPCUA	NS6IString/Machines Machine Too	II Monitoring Channell FeedQverride FURange	FURance	Double click to display value.	ExtensionOt
	8	NodeOPCUA	NS6IStringIMachinet.MachineTop	1. Monitoring Channell FreedOverride EngineeringUnits	EngineeringUnits	Double click to display value	ExtensionOt
	9	NodeOPCUA	NS6IString/Machines Machine Top	11 Monitoring Channell ChannelModifiers BlockSkin	BlockSkin	false	Roolean
	1	0 NodeOPCHA	NS65tringMachines Machine Too	I Monitoring Channell ChannelModifiers Dr.Run	DevRive	false	Roolean
Address Space	ð x	1 NodeOPCUA	NSSIString Machiner Machine Too	Il Montoring Channell ChannelModifierr OntionalSton	OntionalStop	false	Roclass
😏 No Highlight	~ 1	2 NodeOPCUA	NS6IStringMachines Machine Too	Il Montorino Channell ChannelModifier SingleSten	SingleSten	false	Boolean
Root	A 1	NodeOPCUA	NSSIStringMachiner Machine Too	11 Monitoring Channell Avir 3 Name	Name	7	String
V C Objects		A AL-J-ODCUA	NCCIDer - Weshings Machine Tes	B Manitaring Channell Avial Bacilian	Desition	0 10115	Dauble
> 🖨 Aliases		A NODEOPCOA	NSOlstring/Machines.Machine.ioc	11 Monitoring, Channel LAXISS, Position	Position	0.19223	Double
> 🔩 DeviceSet		5 NODEOPLUA	NS0jstringjMachines.Machine.ido	III.Wonitoring.Channell.Axiss.Keterenced	Kererencea	true	Boolean
> 👶 DeviceTopology		NodeOPCUA	NS0jString/Machines.Machine.ioo	II.Monitoring.Channel LAxis2.Name	Name	T 0 (3533)	String
> internalFunctionNodes		7 NodeOPCUA	Nsbjstring[Machines.Machine.loo	11.Monitoring.Channell.Axisz Position	Position	0.125334	Double
> 😂 Locations	38	8 NodeOPCUA	N56[String]Machines Machine loo	II.Monitoring.Channell.Axis2.Keferenced	Kelerenced	true	Boolean
🛩 🚞 Machines	19	9 NodeOPCUA	NS6[String]Machines.Machine.loo	i1.Monitoring.Channel1.Axis1.Name	Name	X	String
🛩 🚜 EMCOMachineTool	20	0 NodeOPCUA	NS6[String]Machines.MachineToo	II.Monitoring.Channel1.Axis1.Position	Position	0.288093	Double
👻 💑 ControlCommands	2	1 NodeOPCUA	NS6[String]Machines.MachineToo	II.Monitoring.Channel1.Axis1.Referenced	Referenced	true	Boolean
💙 💑 CommandsObject	2	2 NodeOPCUA	NS6[String]Machines.MachineToo	11.Monitoring,Channel1.Axis1.Position.EngineeringUnits	EngineeringUnits	Double click to display value	ExtensionOt
Of the second	2	3 NodeOPCUA	NS6 String Machines.MachineToo	11.Monitoring.Channel1.Axis2.Position.EngineeringUnits	EngineeringUnits	Double click to display value	ExtensionOb
> 🧐 Door	2	4 NodeOPCUA	NS6[String]Machines.MachineToo	i1.Monitoring.Channel1.Axis3.Position.EngineeringUnits	EngineeringUnits	Double click to display value	ExtensionOt
V OperationMode	2	5 NodeOPCUA	NS6[String]Machines.MachineToo	II.StringParameter.Value0	StringParameter0		String
InputArguments	Rebrowse	NodeOPCUA	NS6[String]Machines.MachineToo	11.StringParameter.Value1	StringParameter1		String
OutputArgument:	Call	NodeOPCUA	NS6[String[Machines.MachineToo	11.StringParameter.Value2	StringParameter2		String
ProgramStart	21	8 NodeOPCUA	NS6jStringjMachines.MachineToo	II.StringParameter.Value3	StringParameter3		String
ProgramStop	25	9 NodeOPCUA	NS6]String]Machines.MachineToo	11.StringParameter.Value4	StringParameter4		String
7 V Reference	34	0 NodeOPCUA	NS6[String]Machines.MachineToo	I1.StringParameter.Value5	StringParameterS		String
) 🧐 Reset	3	1 NodeOPCUA	NS6 String Machines.MachineToo	11.StringParameter.Value6	StringParameter6		String
SelectProgram	3.	2 NodeOPCUA	NS6[String]Machines.MachineToo	11.StringParameter.Value7	StringParameter7		String
SetFeedOverride	33	3 NodeOPCUA	NS6[String]Machines.MachineToo	IT.StringParameter.Value8	StringParameter8		String
SetSpeedOverride	3	4 NodeOPCUA	NS6[String]Machines.MachineToo	IT.StringParameter.Value9	StringParameter9		String
> III Tool	33	5 NodeOPCUA	NS6[String]Machines.MachineToo	II.UserParameter.Value0	UserParameter0	0	Double
> 💑 Equipment	3/	6 NodeOPCUA	NS6[String]Machines.MachineToo	d1.UserParameter.Value1	UserParameter1	0	Double
> 🤤 Identification	3	7 NodeOPCUA	NS6[String]Machines.MachineToo	II.UserParameter.Value2	UserParameter2	0.78965	Double
> 🚜 Monitoring	3	8 NodeOPCUA	NS6IStringIMachines.MachineToo	11.UserParameter.Value3	UserParameter3	23.2	Double '
> 💑 Notification	~ <						>
Loo							
Timestamo	Source		Centrer	Merrane			
10.10.2023 10:15:07.365	Event Plugin		NodeOPCUA	Call ConditionRefresh returned Good for Serveria	d NodeOPCUA.		
10.10.2023 10:17:07.577	AddressSpace	Model	NodeOPCUA	Browse on node 'ns=4;i=1001' succeeded.	o on Station Seals		
10.10.2023 10:17:08.579	AddressSpace	Model	NodeOPCUA	Browse on node 'ns=6;s=Machines.MachineTool	I1' succeeded.		
10.10.2023 10:17:10.241	AddressSpace	Model	NodeOPCUA	Browse on node 'ns=6;s=Machines.MachineTool	1.ControlCommands'	succeeded.	
10.10.2023 10:17:11.393	AddressSpace	Model	NodeOPCUA	Browse on node 'ns=6;s=Machines.MachineTool	11.ControlCommands.	CommandsObject' succeeded.	
10.10.2023 10.17.16.413	Method Plusi	in .	NodeOPCUA	The method has input and output assuments	one succeeded liet a	00001-	
10.10.2023 10:18:12.242	Method Pluni	in	NodeOPCUA	Call succeeded			
10.10.2023 10:55:00.798	AddressSpace	Model	NodeOPCUA	Browse on node 'ns=6;s=OperationMode' succe	eded.		

Input Argum	ents					
Name	Value	DataType	Description			
OperationMode	2	Int32	Operation mode as number (Automatic: 0.MdaMdi: 1. JogManual: 2. JogIncrement			
	[3,Reference:6)			
Output Argur	nents					
Name	Value	DataType	Description			
Success		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.Channel-Mode, ob das Kommando von der Steuerung ausgeführt wurde.

Unified Automation UaExpert - The OPC Un	fied Architectu	ire Client + umati2				
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) 🖉 🖓 🙆 🌞 🖛 🌣	× %					
Project	8 ×	Data Access View Event View	6			
🛩 🗊 Project	^	# Server		Node Id	Display Name	
✓		1 NodeOPCUA	NS6[String Machines.Machine	Tool1.Monitoring.Channel1.ActTool	ActTool	0
NodeOPCUA		2 NodeOPCUA	NS6 String Machines.Machine	Tool1.Monitoring.Channel1.ChannelMode	ChannelMode	2 (JogManual)
		3 NodeOPCUA	NS6 String Machines.Machine	Tool1.Monitoring.Channel1.ChannelState	ChannelState	2 (Reset)
Address space	D' X	4 NodeOPCUA	NS6 String Machines.Machine	Tool1.Monitoring.Channel1.FeedOverride	FeedOverride	100
No Highlight	~	5 NodeOPCUA	NS6 String Machines.Machine	Tool1.Monitoring.Channel1.Name	Name	Channel1
Y 🙆 Machines		6 NodeOPCUA	NS6[String Machines.Machine	Tool1.Monitoring.Channel1.SelectedProgram	SelectedProgram	C:/WinNC_festoFre
BMCOMachineTool B ControlCommands B ControlCommands		7 NodeOPCUA	NS6 String Machines.Machine	Tool1.Monitoring.Channel1.FeedOverride.EURange	EURange	Double click to dis
		8 NodeOPCUA	NS6 String Machines.Machine	Tool1.Monitoring.Channel1.FeedOverride.EngineeringUnits	EngineeringUnits Double clic	Double click to dis
> in Equipment		9 NodeOPCUA	NS6 String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.BlockSkip NS6 String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.DryRun		BlockSkip false	false
Monitoring		10 NodeOPCUA			DryRun	false
Y Channell		11 NodeOPCUA	NS6[String Machines.Machine	Tool1.Monitoring.Channel1.ChannelModifiers.OptionalStop	OptionalStop	false
		12 NodeOPCUA	NS6[String]Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.SingleStep		SingleStep	false
> 📥 Axis1		13 NodeOPCUA	NS6 String Machines.Machine	Name	Z	
> 📥 Axis2		14 NodeOPCUA	NS6 String Machines.Machine	Tool1.Monitoring.Channel1.Axis3.Position	Position	0.19225
> 💑 Axis3		15 NodeOPCUA	NS6[String Machines.Machine	Tool1.Monitoring.Channel1.Axis3.Referenced	Referenced	true
ChannelMode		16 NodeOPCUA	NS6 String Machines.Machine	Tool1.Monitoring.Channel1.Axis2.Name	Name	Y
> 👶 ChannelModifiers > 💷 ChannelState		17 NodeOPCUA	NS6 String Machines.Machine	Tool1.Monitoring.Channel1.Axis2.Position	Position	0.125334
Log 😫 🕞						
Timestamp	Source		Server	Message		
10.10.2023 13:43:04.196	AddressSn	aceModel	NodeOPCUA	Browse on node 'ns=frs=Machines MachineTon	11.Monitoring' succeer	led.
10.10.2023 13:43:06.434	AddressSp	aceModel	NodeOPCUA	Browse on node 'ns=6;s=Machines.MachineToo	11.Monitoring.Channel	1' succeeded.
10.10.2023 13:43:08.977	AddressSp	aceModel	NodeOPCUA	Browse on node 'ns=6;s=Machines.MachineToo	11.Monitoring.Channel	1.ChannelMode' succ
10.10.2023 13:43:10.136	Attribute P	lugin	NodeOPCUA Read attributes of node 'NS6IStrinolMachines.Machine			g.Channel1.ChannelN

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

- 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

with the following CNC control types:

• 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 <u>https://documentation.unified-automation.com</u> and <u>Machine Tools - Monitoring and Job Overview (opcfoundation.org)</u>

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		
ТооІ	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 readonly access or with the following login credentials: user: admin, password: pw1





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

Ad	dress Space	e 87 X
-	No Highligh	nt N
	>	🐒 MachineOperationMonitoringType 🖌
	~	🐒 MachineToolType
		Y 🐔 EmcoMachineToolType
		> 👶 ControlCommands
		> 👶 Equipment
		> 🛅 Identification
		> 👶 Monitoring
		> 👶 Notification
		> 👶 PeripheralDevices
		> 👶 Production
		> 💑 UserParameter
		> 臱 Equipment
		> 🛅 Identification
		> 뤚 Monitoring
		> 💑 Notification
		> 💑 Production
	>	1 Messages Type
	>	🐒 ModellingRuleType
	>	1 Monitoring Type
	>	1 NamespaceMetadataType
	>	1 NamespacesType
	>	1 NetworkAddressType
	>	1 NetworkType
	>	1 NotificationType
	>	1 OrderedListType
	>	1 PriorityMappingTableType
	>	1 ProductionJobType
	>	ProductionPartSetType
	>	1 ProductionPartType
	~	T ProductionProgram Type
		🤗 Name
		NumberInList
		Weight Strength Strengt Strengt Strength Strength Strength Strength Strength Strengt

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.

ile View Server Document Settings	Help				
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oject Ø	×	Data Access View Event	ñew .		
Droject	^	# Server	Node Id	Display Name	Value
✓	1	OPC UA Server	NS6 String Machines.MachineTool1.Monitoring.Stacklight.StacklightMode	StacklightMode	0 (Segmented)
🔕 OPC UA Server	2	OPC UA Server	NS6 String Machines.MachineTool1.Monitoring.Stacklight.Light0.IsPartOfBase	IsPartOfBase	false
📎 anonymEmcoUmati	3	OPC UA Server	NS6 String Machines.MachineTool1.Monitoring.Stacklight.Light0.NumberInList	NumberInList	0
✓	. 4	OPC UA Server	NS6lStringlMachines.MachineTool1.Monitoring.Stacklight.Light0.SignalColor	SignalColor	1 (Red)
Data Access View	× 5	OPC UA Server	NS6IString Machines_MachineTool1_Monitoring_Stacklight_Light0_SignalMode	SignalMode	0 (Continuous)
dress Space 🖉	×	OPC UA Server	NS6IString/Machines-MachineTool1-Equipment.Tools-NodeVersion	NodeVersion	2023-10-24T12:36:39.236
No Highlight	~ 7	OPC UA Server	NS6IStringIMachines MachineTool1 Monitoring Channel1 ChannelModifiers BlockSkin	BlockSkin	false
Root	^ 0	OPC UA Server	NS6IString/Machines MachineTool1 Monitoring Channel1 ChannelModifiers DryRun	DryRun	false
C Objects	0	OPC UA Server	NS6/String/Machines MachineTool1 Monitoring Channel1 ChannelModifiers OntionalSton	OntionalSton	false
> 🛅 Aliases	1	0 OPC UA Server	NS6/String/Machines MachineTool1 Monitoring Channel1 ChannelModifiers SingleSten	SingleStep	false
> 義 DeviceSet		1 OPC UA Server	NSSIStingIMachiner Machine Tool1 Monitoring Stacklight Stacklight Made	StacklightMode	0 (Segmented)
> 嶤 DeviceTopology		2 OPC UA Server	NSSIStingIMachiner MachineTool1 Monitoring MachineTool Operation/Acte	OperationMode	0 (Manual)
> internalFunctionNodes		2 OPC UA Server	Non-the second s	ChannelMode	2 (Instrum
> 🛅 Locations		A ODC UA Server	Nordening Wachings Machine Tool Magination Changel Change Stat	ChannelWode	2 (Depart)
Y 🛅 Machines		4 OPC UA Server	NSojstring Machines.Machine.lool1.Monitoring.Channel1.Channelstate	ChannelState	2 (Keset)
Y 💑 EMCOMachineTool		5 OPC UA Server	NSb String Machines.Machine.lool1.Monitoring.Channel1.FeedOverride	FeedOverride	55
👻 💑 ControlCommands		6 OPC UA Server	NSb[String]Machines.Machine.lool1.Monitoring.Channel1.Name	Name	Channell
Y 💑 CommandsObject	1	7 OPC UA Server	NS6 String Machines.MachineTool1.Monitoring.Channel1.FeedOverride.EURange	EURange	Double click to display value
> ··· Clamping	1	8 OPC UA Server	NS6[String]Machines.MachineTool1.Monitoring.Channel1.FeedOverride.EngineeringUnits	EngineeringUnits	Double click to display value
> iii Door	1	9 OPC UA Server	NS6 String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.BlockSkip	BlockSkip	false
> 👒 OperationMode	2	0 OPC UA Server	NS6 String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.DryRun	DryRun	false
> 👒 ProgramStart	2	1 OPC UA Server	NS6 String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.OptionalStop	OptionalStop	false
> 👒 ProgramStop	2	2 OPC UA Server	NS6[String]Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.SingleStep	SingleStep	false
> 🧐 Reference	2	3 OPC UA Server	NS6 String Machines.MachineTool1.Monitoring.Stacklight.Light0.lsPartOfBase	IsPartOfBase	false
> 👒 Reset	2	4 OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.Light0.NumberInList	NumberInList	0
> SelectProgram	2	5 OPC UA Server	NS6[String Machines.MachineTool1.Monitoring.Stacklight.Light0.SignalColor	SignalColor	1 (Red)
> SetFeedOverride	2	6 OPC UA Server	NS6 String Machines.MachineTool1.Monitoring.Stacklight.Light0.SignalMode	SignalMode	0 (Continuous)
> SetSpeedOverride	2	7 OPC UA Server	NS6 String Machines.MachineTool1.Monitoring.Channel1.ActTool	ActTool	0
> V Tool	2	8 OPC UA Server	NS6 String Machines.MachineTool1.Monitoring.Channel1.ChannelMode	ChannelMode	2 (JogManual)
Company Compan	2	9 OPC UA Server	NS6 String Machines.MachineTool1.Monitoring.Channel1.ChannelState	ChannelState	2 (Reset)
	3	0 OPC UA Server	NS6[String]Machines.MachineTool1.Monitoring.Channel1.FeedOverride	FeedOverride	55
Viodeversion	3	1 OPC UA Server	NS6 String Machines.MachineTool1.Monitoring.Channel1.Name	Name	Channel1
	3	2 OPC UA Server	NS6[String]Machines.MachineTool1.Monitoring.Channel1.SelectedProgram	SelectedProgram	
ldentification	3	3 OPC UA Server	NS6 String Machines.MachineTool1.Monitoring.Channel1.FeedOverride.EURange	EURange	Double click to display value
> A Monitoring	3	4 OPC UA Server	NS6 String Machines.MachineTool1.Monitoring.Channel1.FeedOverride.EngineeringUnits	EngineeringUnits	Double click to display value
Notification	3	5 OPC UA Server	NS6 String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.BlockSkip	BlockSkip	false
> A PerinheralDevices	3	6 OPC UA Server	NS6 String Machines.MachineTool1.Monitoring.Channel1.ChannelModifiers.DrvRun	DryRun	false
Production	3	7 OPC UA Server	NS6IStringlMachines.MachineTool1.Monitoring.Channel1.ChannelModifiers.OntionalStop	OptionalStop	false
X A ActiveProgram		8 OPC UA Server	NS6IStringIMachines MachineTool1, Monitoring, Channel1, ChannelMorlifiers, SingleSten	SingleStep	false
> ActProglam	3	9 OPC UA Server	NS6/String/Machines.MachineTool1.Monitoring.Channel1.Axis3.Name	Name	7
Name		0 OPC UA Server	NS6/String/Machines MachineTool1 Monitoring Channel1 Axis3 Position	Position	0.335
NumberInList		1 OPC IIA Server	NSSISting Machine Machine Tool 1 Monitoring Channel 1 Avis 2 Referenced	Peferenced	true
> 💑 State		2 OPC UA Server	NS6lStringMachines MachineTool1 Monitoring Channell Axis2 Name	Name	ude
> 🐣 ProductionPlan		Dec un server	NGOD in Action Machine Internet Machine Change I Add Deckie	Desition	0
Liss Deservator		C CIPC TIG Server	isonistringistachine: Machine Iool1 Monitoring Enable11 gyic/ Position	PACITION	312



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.

	1000					
Project	cr x Da	ta Access View Event View	h	60000 BD		
Project		Server		Node Id	Display Name	
Y Disevers	11	NodeOPCUA	NS6 String Machines.MachineTool1.	Monitoring.Channel1.ChannelModifiers.OptionalStop	OptionalStop	false
NO NODEUPLUM	12	NodeOPCUA	NS6 String Machines.MachineTool1.	Monitoring.Channel1.ChannelModifiers.SingleStep	SingleStep	false
NodeODCUA@102.46.5.107	13	NodeOPCUA	NS6[String Machines.MachineTool1.	Monitoring.Channel1.Axis3.Name	Name	Z
C NODEOPCOAG133.40.3.157	14	NodeOPCUA	NS6 String Machines.MachineTool1.	Monitoring.Channel1.Axis3.Position	Position	0.19225
Documents Documents Documents	15	NodeOPCUA	NS6 String Machines.MachineTool1.	Monitoring.Channel1.Axis3.Referenced	Referenced	true
Udid Access from	v 16	NodeOPCUA	NS6 String Machines.MachineTool1.	Monitoring.Channel1.Axis2.Name	Name	Y
Address Space	5 × 17	NodeOPCUA	NS6[String Machines.MachineTool1.	Monitoring.Channel1.Axis2.Position	Position	0.125334
💁 No Highlight	~ 18	NodeOPCUA	NS6[String Machines.MachineTool1.	Monitoring.Channel1.Axis2.Referenced	Referenced	true
Name	· 19	NodeOPCUA	NS6[String[Machines.MachineTool1.	Monitoring.Channel1.Axis1.Name	Name	х
> 🥥 SelectedProgram	20	NodeOPCUA	NS6 String Machines.MachineTool1.	Monitoring.Channel1.Axis1.Position	Position	0.288093
> 💑 MachineTool	21	NodeOPCUA	NS6[String Machines.MachineTool1.	Monitoring.Channel1.Axis1.Referenced	Referenced	true
> 💑 Spindle1		NodeOPCUA	NS6 String Machines.MachineTool1.	Monitoring.Channel1.Axis1.Position.EngineeringUnits	EngineeringUnits	Double c
> 💑 Stacklight	23	NodeOPCUA	NS6jString Machines.MachineTool1.	Monitoring.Channel1.Axis2.Position.EngineeringUnits	EngineeringUnits	Double c
> 💑 Notification	24	NodeOPCUA	NS6 String Machines.MachineTool1	Monitoring.Channel1.Axis3.Position.EngineeringUnits	EngineeringUnits	Double c
> 👶 PeripheralDevices	25	NodeOPCUA	N56[String Machines.MachineTool1.	.StringParameter.Value0	StringParameter0	
> 🜲 Production	26	NodeOPCUA	NS6[String]Machines.MachineTool1	.StringParameter.Value1	StringParameter1	
🗸 💑 UserParameter	27	NodeOPCUA	N56[String]Machines.MachineTool1	.StringParameter.Value2	StringParameter2	
> 🥶 StringParameter0	28	NodeOPCUA	NS6 String Machines.MachineTool1	.StringParameter.Value3	StringParameter3	test
> 🤤 StringParameter1	29	NodeOPCUA	NS6[String[Machines.MachineTool]	.StringParameter.Value4	StringParameter4	
> 📹 StringParameter2		NodeOPCUA	NS6IString Machines.MachineTool1	.StringParameter,Value5	StringParameter5	
StringParameter3	31	NodeOPCUA	NS6/String/Machines.MachineTool1.StringParameter.Value6		StringParameter6	
> 🥶 StringParameter4	32	NodeOPCUA	NS6/String/Machines/MachineTool1.StringParameter/Value7		StringParameter7	
> 📹 StringParameter5	33	ModeOPCIIA	NS6/String/Machines MachineTool1 StringParameter Value8		StringParameter8	
> 🤜 StringParameter6	34	NodeOPCIIA	NSRIStringIMachines Machine Tool1. StringParameter Value9		ChringParameter9	
StringParameter7	35	NedeOPCIIA	McGCtring[Machines MachineTool]	UnerOversetar Value()	L'arParameter()	0
StringParameter8	35	ModeOPCUA	MS6/String/Machines.MachineTool1U/JeerParameter.Value1		UserParameter	0
StringParameter9	37	NodeOPCUA	NSOlsting Machines Machine Tool 1. UserParameter Value 1		UserParameter 7	0.79065
UserParameter0	37	Nodeciecula	NS6/String Machines.MachineTool1.UserParameter.Value2		UserParameter2	0.78903
> 💷 UserParameter1	- 30	NodeOPCUA	NS6[String[Machines:Machine lool1.UserParameter.Value3		UserParameters	1455-1
> 🔲 UserParameter2	39	NodeOPCUA	NS6[String[Machines.Machine.tool1.	UserParameter.value4	UserParametera	0
> UserParameter3	40	NodeOPCUA	NS6[String[Machines.Machine10011.	UserParameter.Value5	UserParametero	0
> 🙂 UserParameter4	41	NodeOPCUA	NS6[String]Machines.Machine10011.	UserParameter.Valuet	UserParametero	5,5555
UserParameter5	42	NodeOPCUA	NS6jString Machines.Machine10011.	.UserParameter.Value7	UserParameter7	0
> 💷 UserParameter6	43	NodeOPCUA	NS6[String]Machines.MachineTool1.	.UserParameter.Value8	UserParameter8	0
> 💷 UserParameter7	44	NodeOPCUA	NS6 String Machines.MachineTool1.	.UserParameter.Value9	UserParameter9	0
> 🕲 UserParameter8	v					
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Timestamp	Source		Server	Message		
11.10.2023 07:51:22.438	AddressSpaceN	lodel	NodeOPCUA@193.46.5.197	Browse on node 'ns=6;s=Machines.MachineTool1.	Equipment' succeeded.	e. E.
11.10.2023 07:51:32.597	AddressSpaceN	lodel	NodeOPCUA	Browse on node 'ns=6;s=Machines.MachineTool1.	UserParameter' succeed	led.
11.10.2023 07:51:39.865	Address5pacew	lodel	NodeOPCUA NodeOPCUA	Browse on node ins=b;s=Machines.Machine	StringParameter.Values	'succeeded
11.10.2023 07:52:17.741	DA Plugin		NodeOPCUA	Write to node 'NS6IString Machines.MachineTool1	UserParameter.Value3	succeeded
11.10.2023 07:52:33.074	DA Plugin		NodeOPCUA	Write to node 'NS6/String[Machines.MachineTool1	UserParameter.Value3	succeeded
11.10.2023 07:52:49.931	DA Plugin		NodeOPCUA	Write to node 'NS6 String Machines.MachineTool1.	UserParameter.Value3'	succeeded
11.10.2023 07:52:56.474	Attribute Plugin	í.	NodeOPCUA	Read attributes of node 'NS6/String Machines.Mach	hineTool1.UserParamete	er.Value3' s

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R 2	0.78965	R 22	0	R 42	0				
R 3	23.2	R 23	0	R 43	0				
R 4	0	R 24	0	R 44	0				
R 5	0	R 25	0	R 45	0				
R 6	5.5555	R 26	0	R 46	0	1	12	顧問	7 8 9
R 7	0	R 27	0	R 47	0		10		4 5 6
R 8	0	R 28	0	R 48	0	9	8		1 2 3
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R 10	0	R 30	0	R 50	0		8 8		
R 11	0	R 31	0	R 51	0	· · · · · · · · · · · · · · · · · · ·			
R 12	0	R 32	0	R 52	0				
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R 14	0	R 34	0	R 54	0	Search			
R 15	0	R 35	0	R 55	0				
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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.

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Unified Automation UaExpert - The OPC Unified Architecture Client - emco_umati2 File View Server Document Settings Help) 🖉 🖯 🖉 🔕 🗢 🗕 🛇 🗙 🔩 😫 😫 🖸 1 × Project Data Access View Event View O
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 Servers
 Configuration OPC UA Server Server/Object > OPC UA Server / AlarmCondition v m r Drop event notifiers here from the Address Space window. Address Space 1 × 😏 No Highlight Root
Objects > 🗀 Aliases > 👶 DeviceSet 義 DeviceTopology Apoly - ConternalFunctionNodes AlarmVariable Events ✓ 4 Alarms&Conditions Events Alarms Event History AlarmCondition
 AlarmCondition
 Associate Research Rese 89 : A C Time Severity Server/Object SourceName Message EventType Active > 🗋 Location OPC UA Server ... 5:Messages Block 4 illegal T number TEST 7 AlertType Active 🛩 🗀 Machines 16:36:42.901 OPC UA Server ... 5:Messages X+ Software limit overtravel AlertType Active 🜱 👶 EMCOMachineTool Δ 16:36:43.916 OPC UA Server ... 5:Messages Block 4 illegal T number TEST AlertType Active > 齃 ControlCommands 16:36:43.917 OPC UA Server ... 5:Messages X+ Software limit overtravel AlertType Active > 🔒 Equipment 16:36:44.924 OPC UA Server ... 5:Messages Block 4 illegal T number TEST AlertType Active > 🗀 Identification 16:36:44.925 OPC UA Server ... 5:Messages X+ Software limit overtravel AlertType Active > 🙈 Monitoring 16:36:45.932 OPC UA Server ... 5:Messages Block 4 illegal T number TEST AlertType Active > 🔒 Notification 16:36:45.933 OPC UA Server ... 5:Messages X+ Software limit overtravel AlertType Active > 🜲 PeripheralDevices > A Production Details A > 💑 UserParameter > 🚕 NetworkSet Name Value > 💑 Server ConditionId Nodeld D Types NamespaceIndex D Views IdentifierType Numeric Identifier 1032 AckedState/Id False ActiveState ActiveState/Id True Branchid Nodeld NamespaceIndex IdentifierType 0 Numeric Identifier 0 Log # 🗊 Timestamp 24.10.2023 10:35:01.879 24.10.2023 16:35:01.879 24.10.2023 16:35:01.879 Source Event Plugin Event Plugin Event Plugin Server UPC UA Server OPC UA Server OPC UA Server Message SelectClause [1/]: BadNoMatch SelectClause [18]: BadNothingToDo Calling ConditionRefresh to get current conditions Event Plugin AddressSpaceModel AddressSpaceModel AddressSpaceModel 24.10.2023 16:35:01.885 OPC UA Server Call ConditionRefresh returned Good for ServerId OPC UA Server 24.10.2023 16:36:29.111 24.10.2023 16:36:30.257 24.10.2023 16:36:32.519 Browse on node 'ns=6;s=Machines/MachineTool1' succeeded. Browse on node 'ns=6;s=Machines/MachineTool1' succeeded. Browse on node 'ns=6;s=1001' succeeded. OPC UA Server OPC UA Server OPC UA Server AddressSpaceModel AddressSpaceModel AddressSpaceModel Attribute Plugin Browse on node 'nss5;i=101' Juscceded. Browse on node 'nss5;i=101' Juscceded. Browse on node 'nss1;i=102' succeded. Read attributes of node 'NS1[Numeric[1032' succeded [ret = Good]. 24.10.2023 16:36:33.528 OPC UA Server OPC UA Server OPC UA Server OPC UA Server 24.10.2023 16:36:34.458 24.10.2023 16:36:34.436 24.10.2023 16:36:36.939 24.10.2023 16:36:40.417 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):

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✓ ∰ Project			Server		Node Id	Display Name	Value	Dataty *
✓		1	NodeOPCUA	NS6IStringIMachines.MachineTool	1.Monitoring.Channel1.ActTopl	ActTool	0	UInt32
NodeOPCUA		2	NodeOPCUA	NS6IString Machines_MachineTool	1.Monitoring Channel1.ChannelMode	ChannelMode	0 (Automatic)	Int32
SinumerikServer@ncu1.local		3	NodeOPCUA	NS6[String]Machines.MachineTool	11 Monitoring Channel 1. Channel State	ChannelState	2 (Reset)	int32
Y 🗊 Documents		4	NodeOPCUA	NS6[String]Machines.MachineTool	1.Monitoring.Channel1.FeedOverride	FeedOverride	100	Double
Data Access View		5	NodeOPCUA	NS6[String]Machines.MachineTool	1.Monitoring.Channel1.Name	Name	Channel1	String
🗊 Event View		6	NodeOPCUA	NS6IString[Machines_MachineTool	1. Monitoring. Channel 1. Selected Program	SelectedProgram	C:/WinNC festoFreigabe/HMIoperate.M/PRG/MPF.D/R/	String
		7	NodeOPCUA	NS6IString Machines.MachineTool	1. Monitoring, Channel 1. FeedOverride, EURange	EURange	Double click to display value	ExtensionOb
		8	NodeOPCUA	NS6IString[Machine], Machine Tool	1. Monitoring, Changel 1. FeedOverride, EngineeringUnits	EngineeringUnits	Double click to display value	ExtensionOt
		9	NodeOPCUA	NS6IString Machines.MachineTool	1. Monitoring, Channel 1. Channel Modifiers, Block Skip	BlockSkip	false	Boolean
		10	NodeOPCUA	NS6StringMachines MachineTool	1 Monitoring Channell ChannelModifiers DryRsin	DevRue	false	Roolean
Address Space	ð x	11	NodeOPCUA	NSSIString Machiner Machine Tool	Montoring Channell ChannelModifier OctionalSton	OntionalStop	false	Roclass
😏 No Highlight	~	12	NodeOPCUA	NS6IGringHaching Maching Tool	1 Monitoring Channell ChannelModifier SingleSten	SingleSter	false	Boolean
Root	*	12	NodeOPCUA	NGGGtringMachiner Machine Tool	1 Monitoring Channell Aviz Name	Name	7	String
V C Objects		14	Nodeorcus	NICEIDate and Analysis Marchine Tool	1 Manitarian Channell Avial Parking	Desition	0 10735	Dauble
> 🖨 Aliases		12	NODEOPCOA	history and a second se	1.Monitoring.Channell.Axis3.Position	Position	0.19223	Double
> 💑 DeviceSet		12	NodeOPCUA	NS0jstringjMachines.Machine.tool	1 Monitoring, Channell Axis3 Referenced	Marris	the	Boolean
> 🔔 DeviceTopology		10	NodeOPCUA	NS0jString/Machines/Machine iool	1.Monitoring, Channel 1.Axis2.Name	Name	1	String
InternalFunctionNodes		11	NodeOPCUA	hisojstringjMachines.Machine tool	1.Monitoring.Channell.Axisz.Position	Position	0.122334	Double
> 😂 Locations		10	NodeOPCUA	Nogistring/Machines Machine Iool	1.Monitoring.Channel 1.Axis2.Referenced	Referenced	the	Boolean
🛩 🚞 Machines		19	NodeOPCUA	NS6[String]Machines.MachineTool	1.Monitoring.Channel1.Axis1.Name	Name	X	String
🛩 🚜 EMCOMachineTool		20	NodeOPCUA	NS6[String]Machines.MachineTool	1.Monitoring.Channel1.Axis1.Position	Position	0.288093	Double
👻 💑 ControlCommands		21	NodeOPCUA	NS6[String]Machines.MachineTool	11.Monitoring.Channel1.Axis1.Referenced	Referenced	true	Boolean
💙 義 CommandsObject		22	NodeOPCUA	NS6[String]Machines.MachineTool	1.Monitoring.Channel1.Axis1.Position.EngineeringUnits	EngineeringUnits	Double click to display value	ExtensionOt
Clamping		23	NodeOPCUA	NS6 String Machines.MachineTool	1.Monitoring.Channel1.Axis2.Position.EngineeringUnits	EngineeringUnits	Double click to display value	ExtensionOb
> 🧐 Door		24	NodeOPCUA	NS6[String]Machines.MachineTool	1.Monitoring.Channel1.Axis3.Position.EngineeringUnits	EngineeringUnits	Double click to display value	ExtensionOt
V OperationMode		25	NodeOPCUA	NS6[String]Machines.MachineTool	1.StringParameter.Value0	StringParameter0		String
InputArguments	Rebrowse	8)	NodeOPCUA	NS6[String]Machines.MachineTool	1.StringParameter.Value1	StringParameter1		String
OutputArgument:	Call		NodeOPCUA	NS6[String[Machines.MachineTool	1.StringParameter.Value2	StringParameter2		String
ProgramStart		28	NodeOPCUA	NS6[String]Machines.MachineTool	1.StringParameter.Value3	StringParameter3		String
> September ProgramStop		29	NodeOPCUA	NS6[String]Machines.MachineTool	11.StringParameter.Value4	StringParameter4		String
? Selerence		30	NedeOPCUA	NS6[String]Machines.MachineTool	11.StringParameter.Value5	StringParameterS		String
) 🧐 Reset		31	NodeOPCUA	NS6 String Machines.MachineTool	1.StringParameter.Value6	StringParameter6		String
SelectProgram		32	NodeOPCUA	NS6[String]Machines.MachineTool	11.StringParameter.Value7	StringParameter7		String
SetFeedOverride		33	NodeOPCUA	NS6[String]Machines.MachineTool	1.StringParameter.Value8	StringParameter8		String
SetSpeedOverride		34	NodeOPCUA	NS6[String]Machines.MachineTool	1.StringParameter.Value9	StringParameter9		String
> -9 Tool		35	NodeOPCUA	NS6[String]Machines.MachineTool	11.UserParameter.Value0	UserParameter0	0	Double
> 💑 Equipment		36	NodeOPCUA	NS6[String]Machines.MachineTool	11.UserParameter.Value1	UserParameter1	0	Double
> 😂 Identification		37	NodeOPCUA	NS6[String]Machines.MachineTool	11.UserParameter.Value2	UserParameter2	0.78965	Double
> 💑 Monitoring		38	NedeOPCUA	NS6IStringlMachines.MachineTool	1.UserParameter.Value3	UserParameter3	23.2	Double '
> 💑 Notification	~	<						>
Loo								
8 9								
Timestamp	Source	-		Service	Messane			
10.10.2023 10:15:07.365	Event Plugi	in .		NodeOPCUA	Call ConditionRefresh returned Good for Serverla	NodeOPCUA.		
10.10.2023 10:17:07.577	AddressSpa	aceM	odel	NodeOPCUA	Browse on node 'ns=4/i=1001' succeeded.			
10.10.2023 10:17:08.579	AddressSpa	aceM	odel	NodeOPCUA	Browse on node 'ns=6;s=Machines.MachineTool	1' succeeded.		
10.10.2023 10:17:10.241	AddressSpa	aceM	odel	NodeOPCUA	Browse on node 'ns=6;s=Machines.MachineTool	1.ControlCommands	succeeded.	
10.10.2023 10:17:11.398	AddressSpa	aceM	odei	NedeOPCUA	Browse on node 'ns=b;s=Machines.MachineTool	I. controlCommands.	.commandsubject' succeeded.	
10.10.2023 10:17:16.09	Method Di	unin		NedeOPCUA	The method has input and output aroumants	ane succeeded fiet a	and	
10.10.2023 10:18:12.242	Method Ph	ugin		NodeOPCUA	Call succeeded			
10.10.2023 10:55:00.798	AddressSpa	aceM	odel	NodeOPCUA	Browse on node 'ns=6;s=OperationMode' succe	eded.		

Input Argum	ents					
Name	Value	DataType	Description			
OperationMode	2	Int32	Operation mode as number (Automatic 0 MdaMdi: 1 JogManual: 2 JogTocremen			
operation	-	Inot	3,Reference:6)	er en ren r		
Output Argun	ments					
Name	Value	DataType	Description			
Success		Boolean	Command sent successfully to co	ontrol		
Result						
Succeeded						

- 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.

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Project	θ×	Data Access View Event View				
🛩 👩 Project	^	# Server		Node Id	Display Name	
✓		1 NodeOPCUA	NS6[String]Machines.Machine	Tool1.Monitoring.Channel1.ActTool	ActTool	0
NodeOPCUA		2 NodeOPCUA	NS6 String Machines.Machine	Tool1.Monitoring.Channel1.ChannelMode	ChannelMode	2 (JogManual)
Ph. Ph. Ann. Ann. Ann. Ann. Ann. Ann. Ann. An		3 NodeOPCUA	NS6 String Machines.Machine	Tool1.Monitoring.Channel1.ChannelState	ChannelState	2 (Reset)
Address Space	¢ X	4 NodeOPCUA	NS6[String]Machines.Machine	Tool1.Monitoring.Channel1.FeedOverride	FeedOverride	100
No Highlight	~	5 NodeOPCUA	NS6[String]Machines.Machine	Tool1.Monitoring.Channel1.Name	Name	Channel1
Y 🙆 Machines	^	6 NodeOPCUA	NS6[String Machines.Machine	Tool1.Monitoring.Channel1.SelectedProgram	SelectedProgram	C:/WinNC_festoFrei
Y 💑 EMCOMachineTool		7 NodeOPCUA	NS6[String]Machines.Machine	Tool1.Monitoring.Channel1.FeedOverride.EURange	EURange	Double click to disp
> 💑 ControlCommands		8 NodeOPCUA	NodeOPCUA NS6[String]Machines.MachineTool1.Monitoring.Channel1.FeedOverride.EngineeringUr		EngineeringUnits	Double click to disp
> 💑 Equipment		9 NodeOPCUA	NS6[String]Machines.Machine	Tool1.Monitoring.Channel1.ChannelModifiers.BlockSkip	BlockSkip	false
Manitation		10 NodeOPCUA	NS6[String]Machines.Machine	Tool1.Monitoring.Channel1.ChannelModifiers.DryRun	DryRun	false
Channell		11 NodeOPCUA	NS6 String Machines.Machine	Tool1.Monitoring.Channel1.ChannelModifiers.OptionalStop	OptionalStop	false
		12 NodeOPCUA	NS6[String]Machines.Machine	Tool1.Monitoring.Channel1.ChannelModifiers.SingleStep	SingleStep	false
> 📥 Axis1		13 NodeOPCUA	NS6[String]Machines.Machine	Tool1.Monitoring.Channel1.Axis3.Name	Name	Z
> 📥 Axis2		14 NodeOPCUA	NS6 String Machines.Machine	Tool1.Monitoring.Channel1.Axis3.Position	Position	0.19225
> 💑 Axis3		15 NodeOPCUA	NS6 String Machines.Machine	Tool1.Monitoring.Channel1.Axis3.Referenced	Referenced	true
ChannelMode		16 NodeOPCUA	NS6 String Machines.Machine	Tool1.Monitoring.Channel1.Axis2.Name	Name	Y.
> 義 ChannelModifiers > 📹 ChannelState		17 NodeOPCUA «	NS6[String]Machines.Machine	Tool1.Monitoring.Channel1.Axis2.Position	Position	0.125334
Log 🗱 🛃						
Timestamp	Source		Server	Message		
10.10.2023 13:43:04.196	AddressSp	aceModel	NodeOPCUA	Browse on node 'ns=6:s=Machines.MachineToo	1.Monitoring' succeed	ded.
10.10.2023 13:43:06.434	AddressSp	aceModel	NodeOPCUA	Browse on node 'ns=6;s=Machines.MachineToo	11.Monitoring.Channel	1' succeeded.
10.10.2023 13:43:08.977	AddressSp	aceModel	NodeOPCUA	Browse on node 'ns=6;s=Machines.MachineToo	11.Monitoring.Channel	1.ChannelMode' succeed
10.10.2023 13:43:10.136	Attribute F	Pluain	NodeOPCUA	Read attributes of node 'NS6/String/Machines.M	achineTool1.Monitorin	g.Channel1.ChannelMoc

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



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