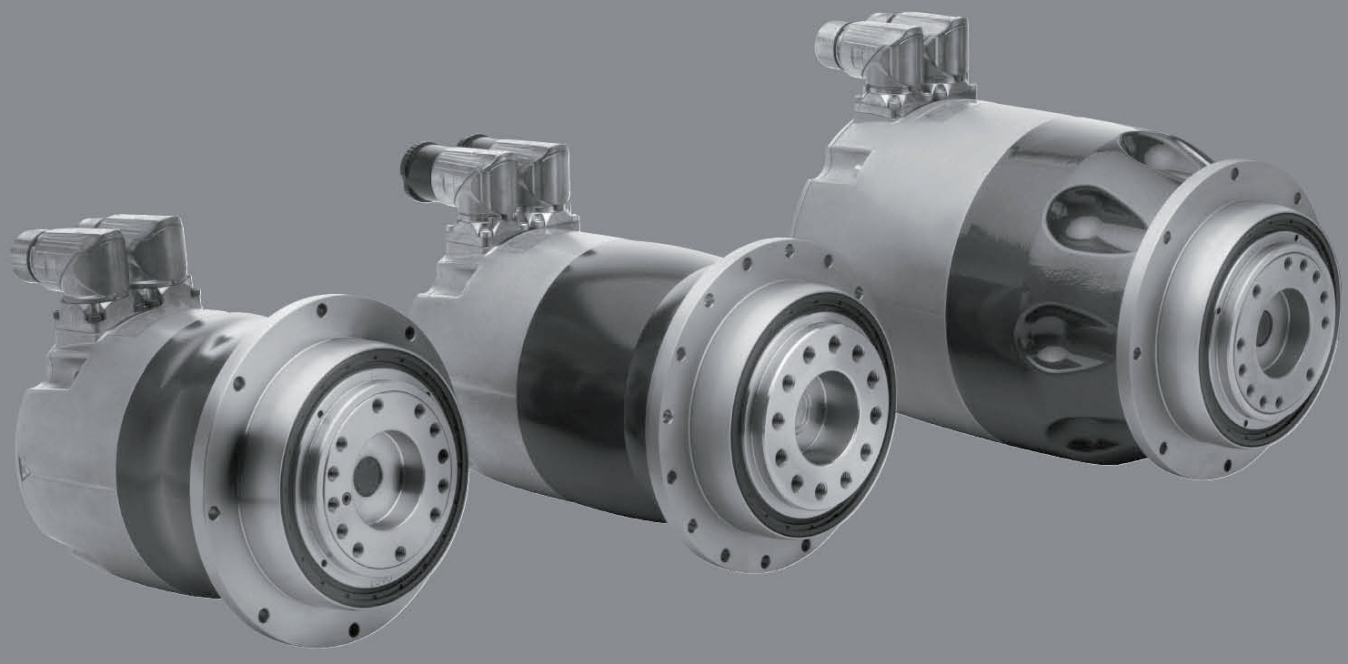
WITTENSTEIN | alpha

TPM+

Siemens SIMODRIVE 611 U/D

Quick Startup Guide



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Revision history

Revision	Date	Comment	Chapter
01	27th July 2012	First release	All
02	27th March 2017	Transition to Wittenstein alpha	All

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1 General Information

1.1 Description, designations

The AC servo actuator **TPM+** (hereafter referred to as servo actuator) is a combination of a low-backlash planetary gearhead and an AC servo motor.
The following manual contains the following points:

- Safety Instructions
- Parameter lists for the **TPM+** series
- Connection schematic for **TPM+**

1.2 Whom does this manual concern?

This manual concerns all persons who install, operate, or maintain this servo actuator.
They may only carry out work on the servo actuator, if they have read and understood this operating manual. Please pass the safety instructions on to other persons as well.

1.3 Which signs and symbols are referred to in this manual?

➲ An “action instruction”, which requires you to carry out an action.

∇ With a “check” you can specify whether the device is ready for the next work stage.

☺ A “usage tip” shows you an option of facilitating or improving operations.

The safety instructions symbols are described in section 2 “Safety”.

1.4 Exclusion of liability

WITTENSTEIN alpha is not liable for damages or injury caused by:

- Improper utilization of the servo actuator and the servo amplifier or
- Incorrect setting of operating parameters.

1.5 EC low-voltage directive / EMC regulations

The servo actuator has been constructed in accordance with EC directive 73/23/EEC. During installation and connection of the electrical components, the relevant regulations have to be observed (for example wire cross sections, fuse protection, etc.). Meeting all requirements for the entire system is the responsibility of the system's manufacturer.
You may only operate the equipment if you comply to the national EMC regulations (refer to the servo amplifier documentation for installation information pertaining to EMC) as they are defined for the given application.

1.6 Copyright

2 Safety

2.1 Intended use

The servo actuator is designed for industrial applications. Its purpose is to drive machines. Please refer to our catalogue or our Internet page for the maximum permitted speeds and torques: www.wittenstein-alpha.de

➲ Please consult our technical service if your servo actuator is more than a year old. In this way you receive valid data.

➲ Please be sure to read the documentation provided by the manufacturer of the servo actuator.

2.2 Improper use

Any use transgressing the above-named restrictions (especially higher torques and speeds) is not compliant with the regulations, and is thus prohibited.
The operation of the servo actuator is prohibited if:

- It was not installed according to regulations (for example fastening bolts).
- The servo actuator is very dirty, damaged or blocked.
- It is operated without lubricant.
- The cables are damaged or improperly connected.
- The operating parameters have not been set properly.

2.3 Safety Instructions

The following symbols are used in this manual to warn you of hazards:

DANGER!
This symbol warns you of danger of injury to yourself and others.

Attention
This symbol warns you of the risk of damage to the servo actuator.

Environment
This symbol warns of environmental pollution risk.

2.3.1 General safety instructions

Working on the servo actuator

DANGER!
Improperly executed work can lead to injury and damage.

➲ Always ensure that the servo actuator is only installed, maintained, and dismantled by trained technicians.

DANGER!

Current-flow through the body or arcing can lead to grave injury and death.

➲ Only perform tasks on the electrical system if you are:

- A trained electrician.
- A person trained in electro-technology, working under the supervision of a specialist electrician.

➲ Always adhere to the five safety rules for the de-energised state:

- De-energise.
- Secure against being turned on (for example by locking it).
- Ensure that de-energised state exists.
- Attach ground line and short-circuit the equipment.
- Cover and safeguard any live parts in the immediate vicinity.

DANGER!

Impurities spinning through the air can cause grave injury.

➲ Before putting the servo actuator into operation, check that there are no impurities or tools near it.

Maintenance

DANGER!

An unintentional start of the machine during maintenance work can lead to serious accidents.

➲ Ensure that no one can start the machine while you are working on it.

DANGER!

Even only briefly running the machine during maintenance work can lead to accidents if the safety devices are not operating.

➲ Check that all safety devices have been mounted and are activated.

Wiring

DANGER!

Incorrect wiring can lead to injuries and damage.

➲ Only use power and signal cables recommended by WITTENSTEIN alpha.

➲ Do not cut off power and signal cables, and do not insert extensions.

➲ Make sure that the U-U, V-V and W-W motor phases are correctly connected.

➲ Make sure that the motor encoder interface of the servo controller is compatible to the servo actuator.

➲ Observe the prescribed voltage for the brakes (usually 24 V DC) and the polarity.

3 Type plate information – identification

➲ The technical specifications can be found on your servo actuator's type plate according to the following scheme.

3.1 Identification plate, designation

The following specifications can be found on the identification plate:

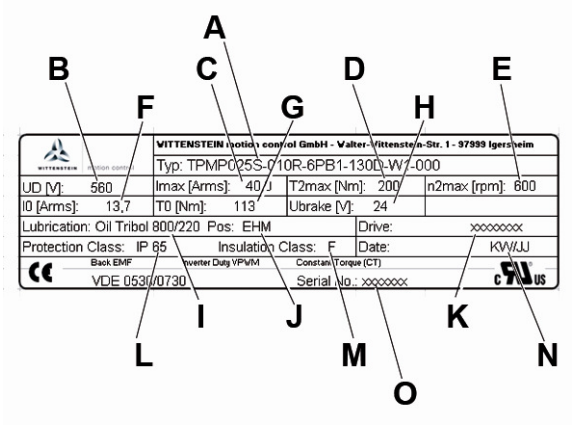
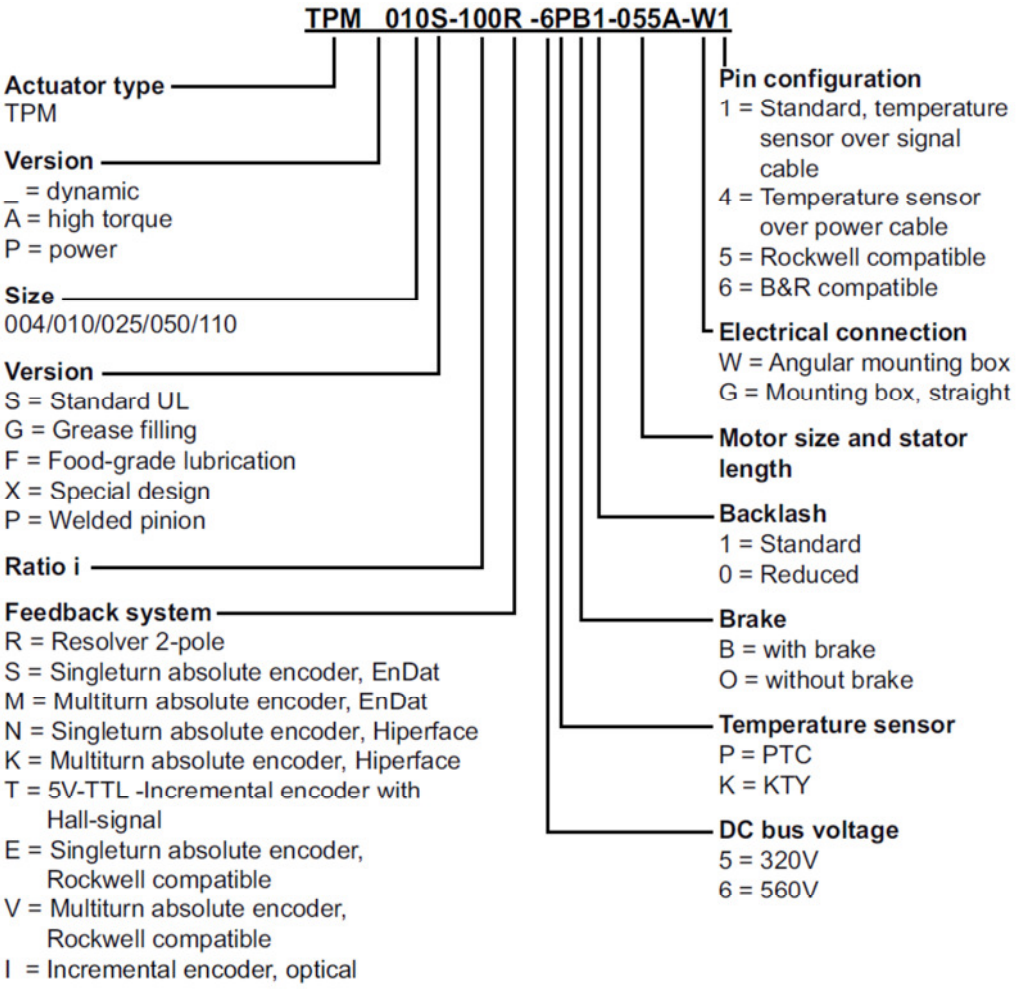


Bild 4.2

A	Ordering code
B	DC-Bus voltage
C	Maximum current
D	Maximum torque at gear output
E	Maximum gear output speed
F	Continuous stall current
G	Continuous stall torque at gear output
H	Brake voltage
I	Lubricant
J	Mounting position
K	For use with drive
L	Type of protection
M	Insulation class
N	Manufacturing date
O	Serial number



4 Setting the parameters

The tables in chapter 4 contain all of the parameters that are required for the initial start-up of a **TPM+** servo actuator from WITTENSTEIN alpha with the servo drive **Siemens SimoDrive 611U/D**.
The parameters can be entered in the drive configuration assistant of the software SimoComU or the Siemens HMI.
When the servo actuator and the servo drive are properly connected, these parameters guarantee that the servo actuator can be operated at idle with speed control.
Based on these default settings, you can optimize the dynamics of the speed controller depending on the application.

Follow the details of the type plate.
Data for combinations not shown here are available on demand.

4.1 Measuring System / Encoder TPM+ with Resolver

In the dialog "Measuring System / Encoder" the follwing settings has to be done depending on the type of TPM.

Inversion of actual speed value:	NO
No. Pole pairs / Speed:	1

4.2 Measuring System / Encoder TPM+ with Heidenhain Endat Multiturn

In the dialog "Measuring System / Encoder" the follwing settings has to be done depending on the type of TPM.

Encoder type:	ABSOLUTE EnDat
Inversion of actual speed value:	NO
Pulses per revolution:	512

4.3 Parameter TPM+ Dynamic 004 560V

Code	Description	Unit	i=16-31 560 VDC	i=61-91 560 VDC
1103	Rated motor current	Arms	1,10	0,80
1104	Max. motor current	Arms	See table below	
1112	Motor pole pair number	-	4	4
1113	Torque constant	Nm/Arms	0,70	0,47
1114	Voltage constant	Vrms/krpm	42,2	28,3
1115	Armature resistance	Ohm	14,10	18,70
1116	Armature inductance	mH	16,65	15,00
1117	Motor moment of inertia	kgm²	See table below	
1118	Motor standstill current	Arms	1,10	0,80
1122	Motor limiting current	Arms	See table below	
1128	Optimum load angle	Degrees	90,0	90,0
1146	Maximum motor speed	RPM	6000	6000
1180	Lower current limit adaptation	%	34	33
1181	Upper current limit adaptation	%	100	100
1182	Current controller data factor	%	89	87
1400	Rated motor speed	RPM	5000	5000

Ratio	Motor inertia w/o brake[kgm²]	Motor inertia with brake[kgm²]	$I_{max\ stat}$ $[A_{rms}]^1$	$I_{max\ dyn}$ $[A_{rms}]^2$
16	0,000021	0,000023	3,20	3,20
21	0,000020	0,000023	2,60	3,20
31	0,000020	0,000022	2,20	3,20
61	0,000012	0,000014	1,40	2,40
64	0,000011	0,000013	1,30	2,40
91	0,000012	0,000014	0,90	2,40

[1] Static maximum motorcurrent: Use this maximum current to protect the gear reducer from overload and to reduce the torque safely to T2B.

[2] Dynamic maximum motorcurrent: For dynamic applications the maximum current can be increased to this value in dependency of the mass moment of inertia relation. We recommend a detailed calculation with Cymex.

4.4 Parameter TPM+ Dynamic 010 560V

Code	Description	Unit	i=16-31 560 VDC	i=61-91 560 VDC
1103	Rated motor current	Arms	1,30	0,90
1104	Max. motor current	Arms	See table below	
1112	Motor pole pair number	-	4	4
1113	Torque constant	Nm/Arms	0,97	0,78
1114	Voltage constant	Vrms/krpm	58,5	47,4
1115	Armature resistance	Ohm	10,65	20,00
1116	Armature inductance	mH	11,40	15,00
1117	Motor moment of inertia	kgm²	See table below	
1118	Motor standstill current	Arms	1,30	0,90
1122	Motor limiting current	Arms	See table below	
1128	Optimum load angle	Degrees	90,0	90,0
1146	Maximum motor speed	RPM	6000	6000
1180	Lower current limit adaptation	%	25	30
1181	Upper current limit adaptation	%	100	100
1182	Current controller data factor	%	75	81
1400	Rated motor speed	RPM	5000	5000

Ratio	Motor inertia w/o brake[kgm²]	Motor inertia with brake[kgm²]	$I_{max\ stat}$ [A_{rms}][1]	$I_{max\ dyn}$ [A_{rms}][2]
16	0,000032	0,000034	5,20	5,20
21	0,000032	0,000034	5,20	5,20
31	0,000032	0,000034	4,70	5,20
61	0,000017	0,000019	2,20	3,00
64	0,000017	0,000019	2,10	3,00
91	0,000017	0,000019	1,50	3,00

[1] Static maximum motorcurrent: Use this maximum current to protect the gear reducer from overload and to reduce the torque safely to T2B.

[2] Dynamic maximum motorcurrent: For dynamic applications the maximum current can be increased to this value in dependency of the mass moment of inertia relation. We recommend a detailed calculation with Cymex.

4.5 Parameter TPM+ Dynamic 025 560V

Code	Description	Unit	i=16-31 560 VDC	i=61-91 560 VDC
1103	Rated motor current	Arms	5,70	1,90
1104	Max. motor current	Arms	See table below	
1112	Motor pole pair number	-	6	6
1113	Torque constant	Nm/Arms	0,98	1,02
1114	Voltage constant	Vrms/krpm	59,5	61,3
1115	Armature resistance	Ohm	1,10	6,75
1116	Armature inductance	mH	3,00	9,45
1117	Motor moment of inertia	kgm²	See table below	
1118	Motor standstill current	Arms	5,70	1,90
1122	Motor limiting current	Arms	See table below	
1128	Optimum load angle	Degrees	90,0	90,0
1146	Maximum motor speed	RPM	6000	6000
1180	Lower current limit adaptation	%	34	32
1181	Upper current limit adaptation	%	100	100
1182	Current controller data factor	%	73	72
1400	Rated motor speed	RPM	5000	5000

Ratio	Motor inertia w/o brake[kgm²]	Motor inertia with brake[kgm²]	$I_{max\ stat}$ [A_{rms}][1]	$I_{max\ dyn}$ [A_{rms}][2]
16	0,000216	0,000235	17,00	17,00
21	0,000216	0,000235	17,00	17,00
31	0,000217	0,000236	14,10	17,00
61	0,000077	0,000096	5,90	6,00
64	0,000076	0,000095	5,60	6,00
91	0,000076	0,000095	3,80	6,00

[1] Static maximum motorcurrent: Use this maximum current to protect the gear reducer from overload and to reduce the torque safely to T2B.

[2] Dynamic maximum motorcurrent: For dynamic applications the maximum current can be increased to this value in dependency of the mass moment of inertia relation. We recommend a detailed calculation with Cymex.

4.6 Parameter TPM+ Dynamic 050 560V

Code	Description	Unit	i=16-31 560 VDC	i=61-91 560 VDC
1103	Rated motor current	Arms	13,70	3,80
1104	Max. motor current	Arms	See table below	
1112	Motor pole pair number	-	6	6
1113	Torque constant	Nm/Arms	1,00	0,97
1114	Voltage constant	Vrms/krpm	61,0	58,7
1115	Armature resistance	Ohm	0,22	2,00
1116	Armature inductance	mH	1,50	5,55
1117	Motor moment of inertia	kgm²	See table below	
1118	Motor standstill current	Arms	13,70	3,80
1122	Motor limiting current	Arms	See table below	
1128	Optimum load angle	Degrees	90,0	90,0
1146	Maximum motor speed	RPM	5000	5000
1180	Lower current limit adaptation	%	34	32
1181	Upper current limit adaptation	%	100	100
1182	Current controller data factor	%	72	67
1400	Rated motor speed	RPM	4167	4167

Ratio	Motor inertia w/o brake[kgm²]	Motor inertia with brake[kgm²]	$I_{max\ stat}$ [A_{rms}][1]	$I_{max\ dyn}$ [A_{rms}][2]
16	0,000907	0,001007	40,00	40,00
21	0,000907	0,001007	34,30	40,00
31	0,000894	0,000993	29,40	40,00
61	0,000251	0,000351	12,00	12,00
64	0,000249	0,000349	12,00	12,00
91	0,000249	0,000349	8,40	12,00

[1] Static maximum motorcurrent: Use this maximum current to protect the gear reducer from overload and to reduce the torque safely to T2B.

[2] Dynamic maximum motorcurrent: For dynamic applications the maximum current can be increased to this value in dependency of the mass moment of inertia relation. We recommend a detailed calculation with Cymex.

4.7 Parameter TPM+ Dynamic 110 560V

Code	Description	Unit	i=16-31 560 VDC	i=61-91 560 VDC
1103	Rated motor current	Arms	16,70	13,70
1104	Max. motor current	Arms	See table below	
1112	Motor pole pair number	-	6	6
1113	Torque constant	Nm/Arms	1,00	1,00
1114	Voltage constant	Vrms/krpm	61,0	61,0
1115	Armature resistance	Ohm	0,16	0,22
1116	Armature inductance	mH	1,20	1,50
1117	Motor moment of inertia	kgm²	See table below	
1118	Motor standstill current	Arms	16,70	13,70
1122	Motor limiting current	Arms	See table below	
1128	Optimum load angle	Degrees	90,0	90,0
1146	Maximum motor speed	RPM	5000	5000
1180	Lower current limit adaptation	%	24	34
1181	Upper current limit adaptation	%	100	100
1182	Current controller data factor	%	63	72
1400	Rated motor speed	RPM	4167	4167

Ratio	Motor inertia w/o brake[kgm²]	Motor inertia with brake[kgm²]	$I_{max\ stat}$ [A_{rms}][1]	$I_{max\ dyn}$ [A_{rms}][2]
16	0,001314	0,001414	70,00	70,00
21	0,001314	0,001414	70,00	70,00
31	0,001284	0,001384	70,00	70,00
61	0,000889	0,000988	30,00	40,00
64	0,000883	0,000983	28,30	40,00
91	0,000883	0,000983	18,00	40,00

[1] Static maximum motorcurrent: Use this maximum current to protect the gear reducer from overload and to reduce the torque safely to T2B.

[2] Dynamic maximum motorcurrent: For dynamic applications the maximum current can be increased to this value in dependency of the mass moment of inertia relation. We recommend a detailed calculation with Cymex.

4.8 Parameter TPM+ Power 004 560V

Code	Description	Unit	i=4-35 560 VDC	i=40-100 560 VDC
1103	Rated motor current	Arms	1,60	1,00
1104	Max. motor current	Arms	See table below	
1112	Motor pole pair number	-	4	4
1113	Torque constant	Nm/Arms	0,97	0,78
1114	Voltage constant	Vrms/krpm	58,5	47,4
1115	Armature resistance	Ohm	10,65	20,00
1116	Armature inductance	mH	11,40	15,00
1117	Motor moment of inertia	kgm²	See table below	
1118	Motor standstill current	Arms	1,60	1,00
1122	Motor limiting current	Arms	See table below	
1128	Optimum load angle	Degrees	90,0	90,0
1146	Maximum motor speed	RPM	6000	6000
1180	Lower current limit adaptation	%	30	33
1181	Upper current limit adaptation	%	100	100
1182	Current controller data factor	%	75	81
1400	Rated motor speed	RPM	5000	5000

Ratio	Motor inertia w/o brake[kgm²]	Motor inertia with brake[kgm²]	$I_{max\ stat}$ [A_{rms}][1]	$I_{max\ dyn}$ [A_{rms}][2]
4	0,000039	0,000041	5,20	5,20
5	0,000036	0,000038	5,20	5,20
7	0,000033	0,000035	5,20	5,20
10	0,000031	0,000034	3,60	5,20
16	0,000032	0,000034	4,40	5,20
20	0,000031	0,000034	3,50	5,20
25	0,000031	0,000034	2,80	5,20
28	0,000031	0,000033	2,50	5,20
35	0,000031	0,000033	1,90	5,20
40	0,000016	0,000018	2,10	3,00
50	0,000016	0,000018	1,70	3,00
70	0,000016	0,000018	1,20	3,00
100	0,000016	0,000018	0,60	3,00

[1] Static maximum motorcurrent: Use this maximum current to protect the gear reducer from overload and to reduce the torque safely to T2B.

[2] Dynamic maximum motorcurrent: For dynamic applications the maximum current can be increased to this value in dependency of the mass moment of inertia relation. We recommend a detailed calculation with Cymex.

4.9 Parameter TPM+ Power 010 560V

Code	Description	Unit	i=4-35 560 VDC	i=40-100 560 VDC
1103	Rated motor current	Arms	5,40	1,90
1104	Max. motor current	Arms	See table below	
1112	Motor pole pair number	-	6	6
1113	Torque constant	Nm/Arms	0,98	1,02
1114	Voltage constant	Vrms/krpm	59,5	61,3
1115	Armature resistance	Ohm	1,10	6,75
1116	Armature inductance	mH	3,00	9,45
1117	Motor moment of inertia	kgm²	See table below	
1118	Motor standstill current	Arms	5,40	1,90
1122	Motor limiting current	Arms	See table below	
1128	Optimum load angle	Degrees	90,0	90,0
1146	Maximum motor speed	RPM	6000	6000
1180	Lower current limit adaptation	%	32	31
1181	Upper current limit adaptation	%	100	100
1182	Current controller data factor	%	73	72
1400	Rated motor speed	RPM	5000	5000

Ratio	Motor inertia w/o brake[kgm²]	Motor inertia with brake[kgm²]	$I_{max\ stat}$ [A_{rms}][1]	$I_{max\ dyn}$ [A_{rms}][2]
4	0,000238	0,000257	17,00	17,00
5	0,000222	0,000241	17,00	17,00
7	0,000208	0,000227	17,00	17,00
10	0,000200	0,000219	12,20	17,00
16	0,000202	0,000221	11,50	17,00
20	0,000199	0,000218	8,90	17,00
25	0,000198	0,000217	6,90	17,00
28	0,000196	0,000215	6,00	17,00
35	0,000196	0,000214	4,70	17,00
40	0,000072	0,000091	4,70	6,00
50	0,000072	0,000091	3,70	6,00
70	0,000072	0,000091	2,70	6,00
100	0,000072	0,000091	1,50	6,00

[1] Static maximum motorcurrent: Use this maximum current to protect the gear reducer from overload and to reduce the torque safely to T2B.

[2] Dynamic maximum motorcurrent: For dynamic applications the maximum current can be increased to this value in dependency of the mass moment of inertia relation. We recommend a detailed calculation with Cymex.

4.10 Parameter TPM+ Power 025 560V

Code	Description	Unit	i=4-35 560 VDC	i=40-100 560 VDC
1103	Rated motor current	Arms	13,70	4,00
1104	Max. motor current	Arms	See table below	
1112	Motor pole pair number	-	6	6
1113	Torque constant	Nm/Arms	1,00	0,97
1114	Voltage constant	Vrms/krpm	61,0	58,7
1115	Armature resistance	Ohm	0,22	2,00
1116	Armature inductance	mH	1,50	5,55
1117	Motor moment of inertia	kgm²	See table below	
1118	Motor standstill current	Arms	13,70	4,00
1122	Motor limiting current	Arms	See table below	
1128	Optimum load angle	Degrees	90,0	90,0
1146	Maximum motor speed	RPM	6000	6000
1180	Lower current limit adaptation	%	34	33
1181	Upper current limit adaptation	%	100	100
1182	Current controller data factor	%	72	67
1400	Rated motor speed	RPM	5000	5000

Ratio	Motor inertia w/o brake[kgm²]	Motor inertia with brake[kgm²]	$I_{max\ stat}$ [A_{rms}][1]	$I_{max\ dyn}$ [A_{rms}][2]
4	0,000998	0,001098	40,00	40,00
5	0,000950	0,001050	40,00	40,00
7	0,000907	0,001007	40,00	40,00
10	0,000884	0,000984	27,00	40,00
16	0,000894	0,000994	29,90	40,00
20	0,000883	0,000982	23,10	40,00
25	0,000881	0,000980	19,50	40,00
28	0,000872	0,000972	15,30	40,00
35	0,000871	0,000971	13,00	40,00
40	0,000248	0,000348	12,00	12,00
50	0,000248	0,000348	12,00	12,00
70	0,000248	0,000347	7,10	12,00
100	0,000247	0,000347	3,70	12,00

[1] Static maximum motorcurrent: Use this maximum current to protect the gear reducer from overload and to reduce the torque safely to T2B.

[2] Dynamic maximum motorcurrent: For dynamic applications the maximum current can be increased to this value in dependency of the mass moment of inertia relation. We recommend a detailed calculation with Cymex.

4.11 Parameter TPM+ Power 050 560V

Code	Description	Unit	i=4-35 560 VDC	i=40-100 560 VDC
1103	Rated motor current	Arms	19,00	7,50
1104	Max. motor current	Arms	See table below	
1112	Motor pole pair number	-	6	6
1113	Torque constant	Nm/Arms	1,19	0,91
1114	Voltage constant	Vrms/krpm	71,9	55,1
1115	Armature resistance	Ohm	0,14	0,90
1116	Armature inductance	mH	1,05	2,55
1117	Motor moment of inertia	kgm²	See table below	
1118	Motor standstill current	Arms	19,00	7,50
1122	Motor limiting current	Arms	See table below	
1128	Optimum load angle	Degrees	90,0	90,0
1146	Maximum motor speed	RPM	5000	5000
1180	Lower current limit adaptation	%	30	23
1181	Upper current limit adaptation	%	100	100
1182	Current controller data factor	%	75	52
1400	Rated motor speed	RPM	4167	4167

Ratio	Motor inertia w/o brake[kgm²]	Motor inertia with brake[kgm²]	$I_{max\ stat}$ [A_{rms}][1]	$I_{max\ dyn}$ [A_{rms}][2]
4	0,002642	0,002822	63,50	63,50
5	0,002480	0,002660	63,50	63,50
7	0,002334	0,002514	54,90	63,50
10	0,002254	0,002434	38,40	63,50
16	0,002307	0,002487	53,10	63,50
20	0,002261	0,002441	41,70	63,50
25	0,002255	0,002435	32,60	63,50
28	0,002220	0,002400	28,60	63,50
35	0,002217	0,002397	22,20	63,50
40	0,00063	0,00081	33,00	33,00
50	0,000628	0,000808	32,50	33,00
70	0,000627	0,000807	19,90	33,00
100	0,000626	0,000806	8,30	33,00

[1] Static maximum motorcurrent: Use this maximum current to protect the gear reducer from overload and to reduce the torque safely to T2B.

[2] Dynamic maximum motorcurrent: For dynamic applications the maximum current can be increased to this value in dependency of the mass moment of inertia relation. We recommend a detailed calculation with Cymex.

4.12 Parameter TPM+ Power 110 560V

Code	Description	Unit	i=4-35 560 VDC	i=40-100 560 VDC
1103	Rated motor current	Arms	38,60	21,90
1104	Max. motor current	Arms	See table below	
1112	Motor pole pair number	-	6	6
1113	Torque constant	Nm/Arms	1,09	1,08
1114	Voltage constant	Vrms/krpm	66,1	65,3
1115	Armature resistance	Ohm	0,04	0,12
1116	Armature inductance	mH	0,45	0,95
1117	Motor moment of inertia	kgm²	See table below	
1118	Motor standstill current	Arms	38,60	21,90
1122	Motor limiting current	Arms	See table below	
1128	Optimum load angle	Degrees	90,0	90,0
1146	Maximum motor speed	RPM	4200	4500
1180	Lower current limit adaptation	%	39	44
1181	Upper current limit adaptation	%	100	100
1182	Current controller data factor	%	81	82
1400	Rated motor speed	RPM	3500	3750

Ratio	Motor inertia w/o brake[kgm²]	Motor inertia with brake[kgm²]	$I_{max\ stat}$ [A_{rms}][1]	$I_{max\ dyn}$ [A_{rms}][2]
4	0,014173	0,015873	100,00	100,00
5	0,013191	0,014891	100,00	100,00
7	0,012300	0,014000	100,00	100,00
10	0,011812	0,013512	62,60	100,00
16	0,011699	0,013399	100,00	100,00
20	0,011670	0,013370	92,40	100,00
25	0,011630	0,013330	72,90	100,00
28	0,011505	0,013205	64,40	100,00
35	0,011485	0,013185	50,50	100,00
40	0,006023	0,007723	46,00	50,00
50	0,006013	0,007713	36,30	50,00
70	0,006004	0,007704	25,30	50,00
100	0,005999	0,007699	15,50	50,00

[1] Static maximum motorcurrent: Use this maximum current to protect the gear reducer from overload and to reduce the torque safely to T2B.

[2] Dynamic maximum motorcurrent: For dynamic applications the maximum current can be increased to this value in dependency of the mass moment of inertia relation. We recommend a detailed calculation with Cymex.

4.13 Parameter TPM+ High Torque 010 560V

Code	Description	Unit	i=22-110 560 VDC	i=154-220 560 VDC
1103	Rated motor current	Arms	5,00	1,90
1104	Max. motor current	Arms	See table below	
1112	Motor pole pair number	-	6	6
1113	Torque constant	Nm/Arms	0,83	0,82
1114	Voltage constant	Vrms/krpm	50,3	49,2
1115	Armature resistance	Ohm	1,18	7,85
1116	Armature inductance	mH	3,00	9,45
1117	Motor moment of inertia	kgm²	See table below	
1118	Motor standstill current	Arms	5,00	1,90
1122	Motor limiting current	Arms	See table below	
1128	Optimum load angle	Degrees	90,0	90,0
1146	Maximum motor speed	RPM	4850	4850
1180	Lower current limit adaptation	%	29	32
1181	Upper current limit adaptation	%	100	100
1182	Current controller data factor	%	85	89
1400	Rated motor speed	RPM	4042	4042

Ratio	Motor inertia w/o brake[kgm²]	Motor inertia with brake[kgm²]	$I_{max\ stat}$ [A_{rms}][1]	$I_{max\ dyn}$ [A_{rms}][2]
22	0,000206	0,000225	15,00	17,00
27,5	0,000203	0,000222	11,90	17,00
38,5	0,000201	0,000220	8,40	17,00
55	0,000199	0,000218	5,80	17,00
66	-	-	-	-
88	0,000201	0,000220	3,70	17,00
110	0,000200	0,000219	3,00	17,00
154	0,000068	0,000087	2,20	6,00
220	0,000067	0,000086	1,60	6,00

[1] Static maximum motorcurrent: Use this maximum current to protect the gear reducer from overload and to reduce the torque safely to T2B.

[2] Dynamic maximum motorcurrent: For dynamic applications the maximum current can be increased to this value in dependency of the mass moment of inertia relation. We recommend a detailed calculation with Cymex.

4.14 Parameter TPM+ High Torque 025 560V

Code	Description	Unit	i=22-55 560 VDC	i=66-220 560 VDC
1103	Rated motor current	Arms	13,10	5,80
1104	Max. motor current	Arms	See table below	
1112	Motor pole pair number	-	6	6
1113	Torque constant	Nm/Arms	0,98	0,83
1114	Voltage constant	Vrms/krpm	59,2	50,3
1115	Armature resistance	Ohm	0,24	1,18
1116	Armature inductance	mH	1,50	3,00
1117	Motor moment of inertia	kgm²	See table below	
1118	Motor standstill current	Arms	13,10	5,80
1122	Motor limiting current	Arms	See table below	
1128	Optimum load angle	Degrees	90,0	90,0
1146	Maximum motor speed	RPM	4850	4850
1180	Lower current limit adaptation	%	33	34
1181	Upper current limit adaptation	%	100	100
1182	Current controller data factor	%	74	85
1400	Rated motor speed	RPM	4042	4042

Ratio	Motor inertia w/o brake[kgm²]	Motor inertia with brake[kgm²]	$I_{max\ stat}$ [A_{rms}][1]	$I_{max\ dyn}$ [A_{rms}][2]
22	0,000901	0,001000	33,40	40,00
27,5	0,000883	0,000983	26,10	40,00
38,5	0,000874	0,000974	17,80	40,00
55	0,000869	0,000969	11,80	40,00
66	0,000203	0,000222	10,50	17,00
88	0,000196	0,000215	7,80	17,00
110	0,000193	0,000212	6,20	17,00
154	0,000191	0,000210	4,40	17,00
220	0,000189	0,000208	3,10	17,00

[1] Static maximum motorcurrent: Use this maximum current to protect the gear reducer from overload and to reduce the torque safely to T2B.

[2] Dynamic maximum motorcurrent: For dynamic applications the maximum current can be increased to this value in dependency of the mass moment of inertia relation. We recommend a detailed calculation with Cymex.

4.15 Parameter TPM+ High Torque 050 560V

Code	Description	Unit	i=22-55 560 VDC	i=66-220 560 VDC
1103	Rated motor current	Arms	17,90	12,60
1104	Max. motor current	Arms	See table below	
1112	Motor pole pair number	-	6	6
1113	Torque constant	Nm/Arms	1,21	1,00
1114	Voltage constant	Vrms/krpm	73,4	61,0
1115	Armature resistance	Ohm	0,14	0,24
1116	Armature inductance	mH	1,05	1,50
1117	Motor moment of inertia	kgm²	See table below	
1118	Motor standstill current	Arms	17,90	12,60
1122	Motor limiting current	Arms	See table below	
1128	Optimum load angle	Degrees	90,0	90,0
1146	Maximum motor speed	RPM	4500	4850
1180	Lower current limit adaptation	%	28	32
1181	Upper current limit adaptation	%	100	100
1182	Current controller data factor	%	74	72
1400	Rated motor speed	RPM	3750	4042

Ratio	Motor inertia w/o brake[kgm²]	Motor inertia with brake[kgm²]	$I_{max\ stat}$ [A_{rms}][1]	$I_{max\ dyn}$ [A_{rms}][2]
22	0,002380	0,002560	48,10	63,50
27,5	0,002335	0,002515	37,30	63,50
38,5	0,002299	0,002479	25,10	63,50
55	0,002281	0,002461	16,40	63,50
66	0,000923	0,001022	18,20	40,00
88	0,000904	0,001003	12,50	40,00
110	0,000884	0,000983	10,10	40,00
154	0,000874	0,000974	7,20	40,00
220	0,000869	0,000969	5,00	40,00

[1] Static maximum motorcurrent: Use this maximum current to protect the gear reducer from overload and to reduce the torque safely to T2B.

[2] Dynamic maximum motorcurrent: For dynamic applications the maximum current can be increased to this value in dependency of the mass moment of inertia relation. We recommend a detailed calculation with Cymex.

4.16 Parameter TPM+ High Torque 110 560V

Code	Description	Unit	i=22-55 560 VDC	i=66-88 560 VDC	i=110-220 560 VDC
1103	Rated motor current	Arms	tbd	40,80	20,50
1104	Max. motor current	Arms	See table below		
1112	Motor pole pair number	-	6	6	6
1113	Torque constant	Nm/Arms	1,17	1,09	1,19
1114	Voltage constant	Vrms/krpm	70,9	66,1	71,9
1115	Armature resistance	Ohm	0,02	0,04	0,14
1116	Armature inductance	mH	0,34	0,45	1,05
1117	Motor moment of inertia	kgm²	See table below		
1118	Motor standstill current	Arms	tbd	40,80	20,50
1122	Motor limiting current	Arms	See table below		
1128	Optimum load angle	Degrees	90,0	90,0	90,0
1146	Maximum motor speed	RPM	4150	4150	4500
1180	Lower current limit adaptation	%	34	41	32
1181	Upper current limit adaptation	%	100	100	100
1182	Current controller data factor	%	88	81	75
1400	Rated motor speed	RPM	3458	3458	3750

Ratio	Motor inertia w/o brake[kgm²]	Motor inertia with brake[kgm²]	$I_{max\ stat}$ [A_{rms}][1]	$I_{max\ dyn}$ [A_{rms}][2]
22	0,022037	0,023687	tbd	tbd
27,5	0,021891	0,023541	tbd	tbd
38,5	0,021763	0,023413	tbd	tbd
55	0,021694	0,023344	tbd	tbd
66	0,011182	0,012882	40,50	100,00
88	0,010824	0,012524	30,40	100,00
110	0,002286	0,002466	23,00	63,50
154	0,002248	0,002428	15,90	63,50
220	0,002225	0,002405	11,20	63,50

[1] Static maximum motorcurrent: Use this maximum current to protect the gear reducer from overload and to reduce the torque safely to T2B.

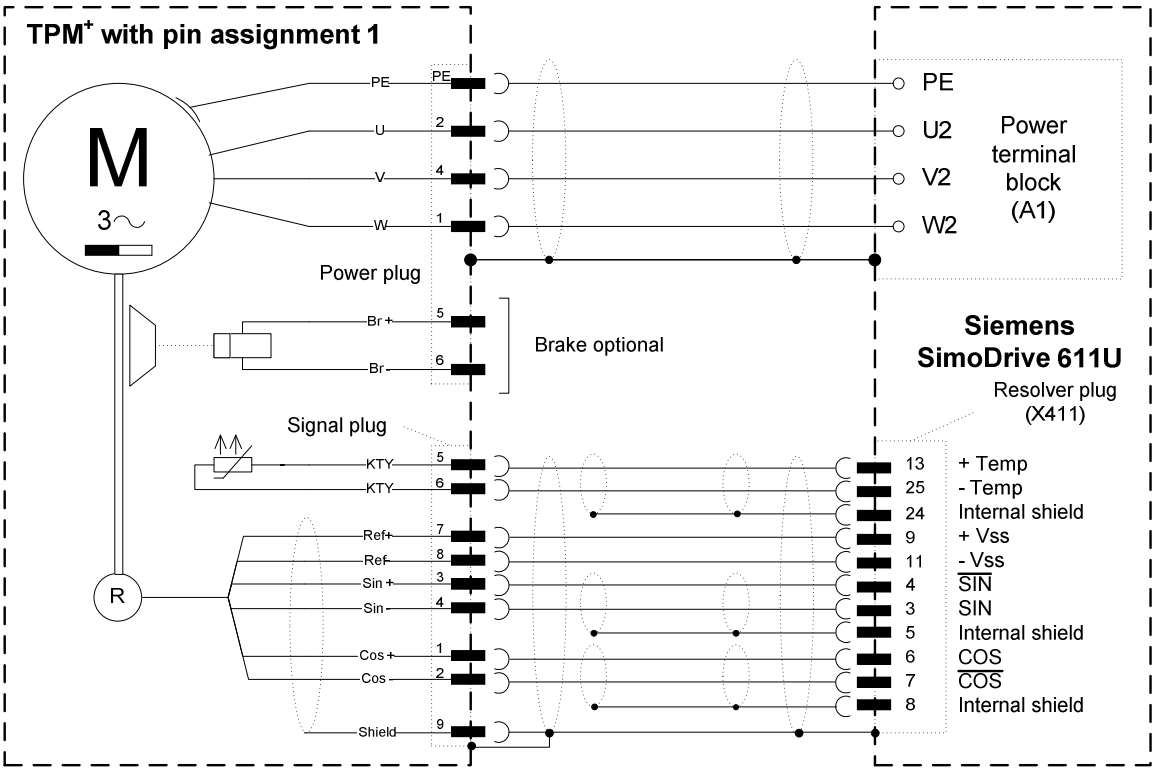
[2] Dynamic maximum motorcurrent: For dynamic applications the maximum current can be increased to this value in dependency of the mass moment of inertia relation. We recommend a detailed calculation with Cymex.

5 Connection schematic TPM+

➲ Detailed information on cable design and the type of shielding can be found in the documentation from the servo drive manufacturer.

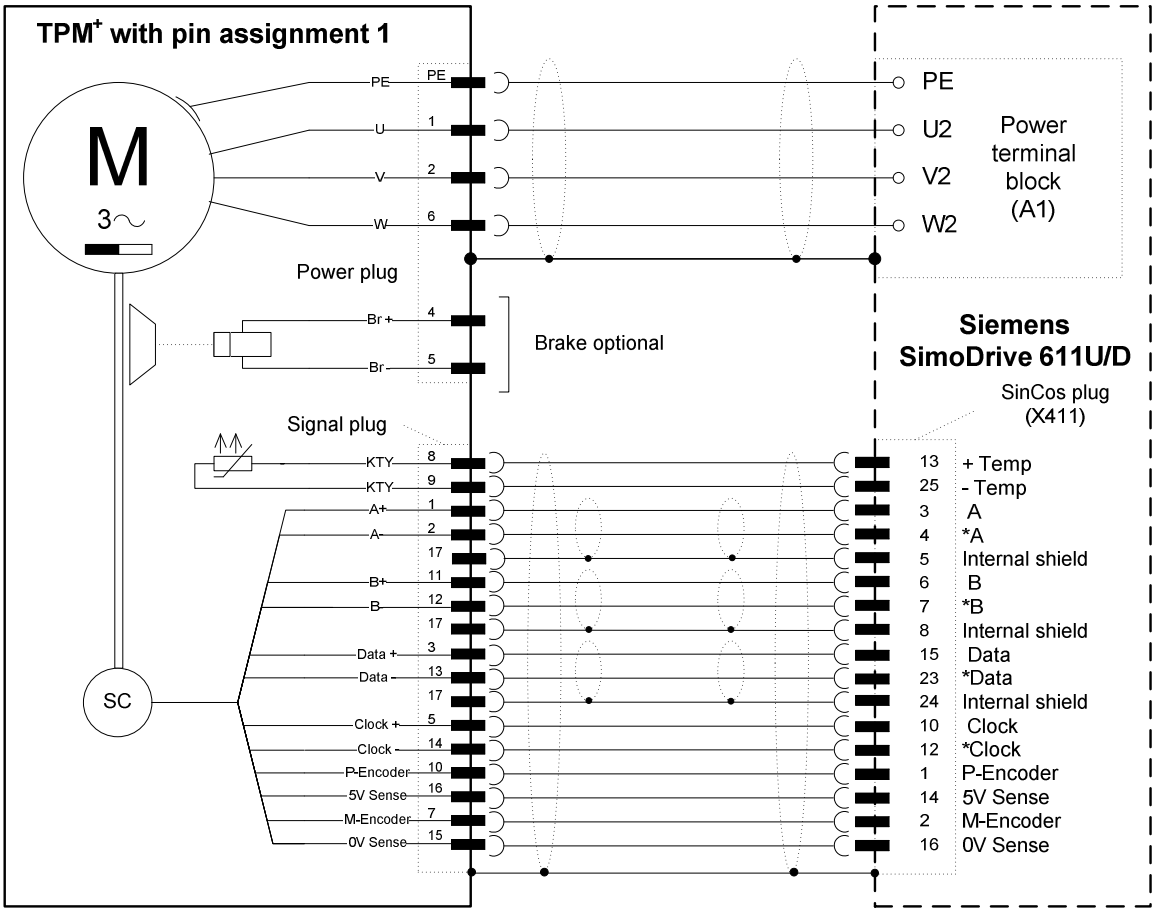
5.1 TPM+ with resolver (only SimoDrive 611U)

WITTENSTEIN alpha offers pre-manufactured and drag chain compatible cablesets for this servo drive. Please take the required order informations from the TPM+ catalogue.

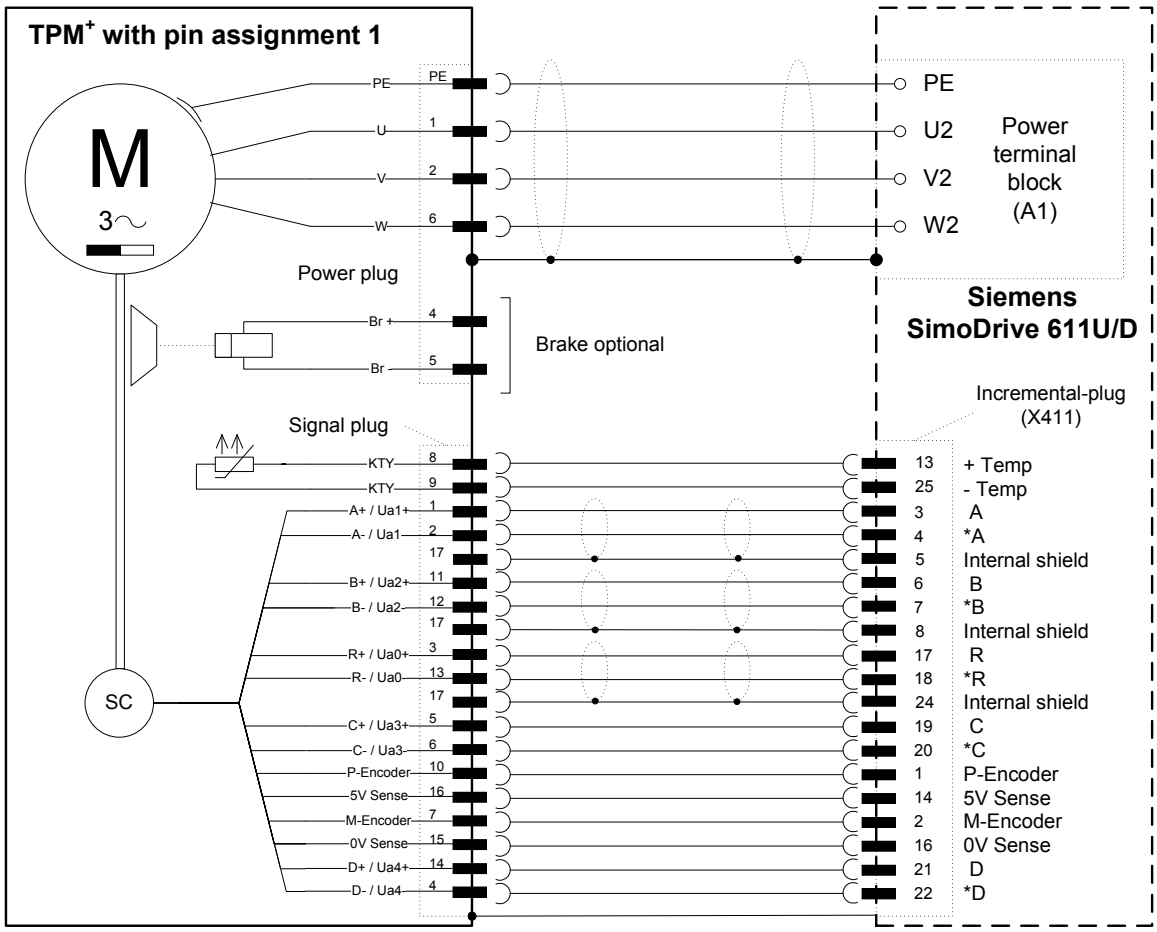


5.2 TPM+ with absolute encoder Heidenhain EnDat EQN 1125

WITTENSTEIN alpha offers pre-manufactured and drag chain compatible cablesets for this servo drive. Please take the required order informations from the TPM+ catalogue.



5.3 TPM+ with incremental encoder Heidenhain ERN 1185



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