WITTENSTEIN motion control

Quick Startup Guide

TPM(A)
004 – 110

CT
UNIDRIVE SP

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1 General Information and Safety Instructions

This guide serves as an aid during start-up and inspection of TPM motor gear units with servo amplifiers. It contains the following points:

- Parameter lists for the TPM series
- Connection schematic for TPM
- Assignment table TPM – Servo amplifier - cable set

Please be sure to carefully read through this document before starting up the TPM and also be sure to read the documentation provided by the manufacturer of the servo amplifier.

WITTENSTEIN motion control will not be held liable for the consequences of the improper, negligent, or incorrect installation or setting of the servo amplifier's operating parameters.

All of the installation, operation, and safety information provided in the servo amplifier documentation is to be observed.

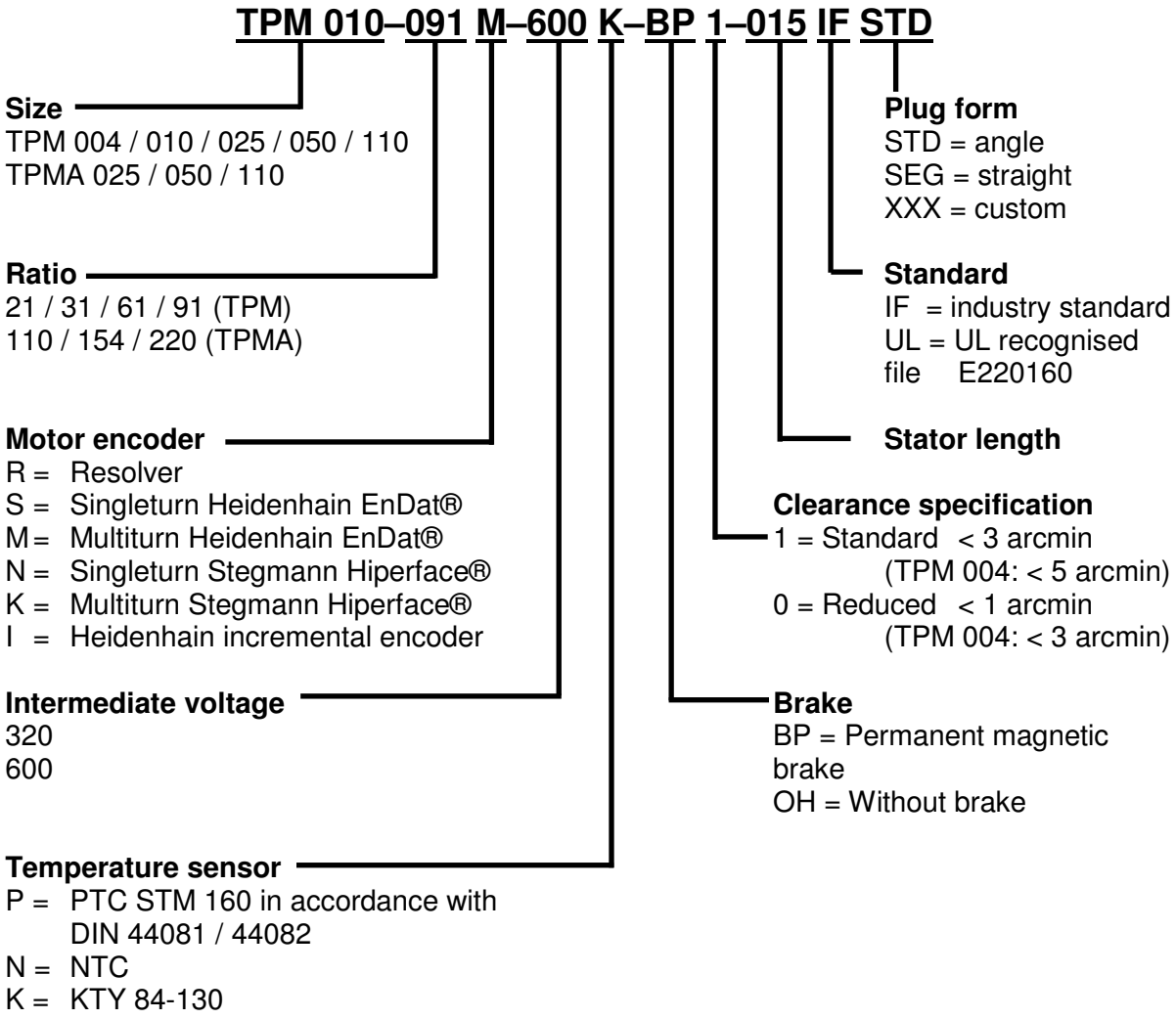
Observe all of the national safety regulations and guidelines of the country where the device is being used. All transportation, installation, start-up, and service work is to be performed by qualified technicians. Qualified technicians are those who are completely familiar with the assembly, installation, and operating procedures, as well as all warnings and safety measures in accordance with the country-specific regulations. Furthermore, they are trained, instructed, and authorised to set the electrical circuits and other devices into operation in accordance with safety regulations.

The drives are intended to be installed in machines being used in commercial applications. 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.

Note: All of the product brand names which appear in this Quick Start Guide are trademarks of the relevant companies. If the ® and/or ™ symbols are omitted, this does imply that the name is a free brand name.

2 Name plate data details

The following specifications can be found on the identification plate. Please select the input parameters corresponding to the nameplate values of your drive.



3 Parameter list motor feedback

3.1 TPM(A) with Resolver

The parameter for the motor feedback has to be entered **before** connecting the motor to the drive.
If you enter wrong parameters the encoder or the drive may be damaged.

Parameter	Parameter name	Unit	TPM004	TPM010	TPM025	TPM050	TPM110
03.26	Speed feedback selector		Slot 1, Slot 2 or Slot 3 depending of slot SM-Resolver				
03.40	Drive encoder error detection level		0	0	0	0	0
xx.10	Equivalent lines per revolution		1024	1024	1024	1024	1024
xx.13	Resolver excitation		1 (2:1)	1 (2:1)	1 (2:1)	1 (2:1)	1 (2:1)
xx.15	Resolver poles		2Pole (0)	2Pole (0)	2Pole (0)	2Pole (0)	2Pole (0)
00.43	Encoder phase angle	°	180	180	180	180	180

3.2 TPM(A) with Heidenhain EnDat

The parameter for the motor feedback has to be entered **before** connecting the motor to the drive.
If you enter wrong parameters the encoder or the drive may be damaged.

Parameter	Parameter name	Unit	TPM004	TPM010	TPM025	TPM050	TPM110
03.26	Speed feedback selector		drv (0)				
03.36	Drive encoder supply voltage		5V	5V	5V	5V	5V
03.38	Drive encoder type		SC.EnDat	SC.EnDat	SC.EnDat	SC.EnDat	SC.EnDat
03.41	Drive encoder auto-configuration		EIN (1)	EIN (1)	EIN (1)	EIN (1)	EIN (1)
00.43	Encoder phase angle	°	180	180	180	180	180

3.3 TPM(A) with Stegmann Hiperface

The parameter for the motor feedback has to be entered **before** connecting the motor to the drive.
If you enter wrong parameters the encoder or the drive may be damaged.

Parameter	Parameter name	Unit	TPM004	TPM010	TPM025	TPM050	TPM110
03.26	Speed feedback selector		drv (0)				
03.36	Drive encoder supply voltage		8V	8V	8V	8V	8V
03.38	Drive encoder type		SC.Hiper	SC.Hiper	SC.Hiper	SC.Hiper	SC.Hiper
03.41	Drive encoder auto-configuration		EIN (1)	EIN (1)	EIN (1)	EIN (1)	EIN (1)
00.43	Encoder phase angle	°	120	120	120	120	120

4 Parameter list TPM 600V ratios 21/31

The following table contains all of the parameters that are required for the initial start-up of a TPM motor-gear unit from WITTENSTEIN motion control together with a Unidrive SP. When the TPM and the servo amplifier are properly connected, these parameters guarantee that the TPM can be operated without load with speed control. Based on these default settings, the dynamics of the speed controller can be optimised depending on the application.
Data for combinations not shown here are available on demand.

Parameter	Parameter name	Unit	TPM004	TPM010	TPM025	TPM050	TPM110
00.41	Maximum switching frequency	kHz	16	16	16	16	16
00.42	No. of motor poles		8	8	12	12	12
00.46	Motor rated current	A	0,7	1,1	3,1	5,6	9,7
00.48	Operating mode selector		SERVO	SERVO	SERVO	SERVO	SERVO
01.06	Maximum reference clamp	RPM	7000	7000	6000	5000	4326
05.08	Rated speed	RPM	6000	6450	4838	4650	3300
05.17	Stator resistance	Ohm	47,4	19,3	3,8	0,36	0,72
05.24	Transient inductance	mH	30,6	20,3	10	2,4	5,4
05.32	Motor torque per amp, Kt	Nm/A	0,67	0,83	1,16	0,91	1,51
00.38	Current loop P gain		After entering of R and L at #5.17 and 5.24 the automatic calculating is started after setting #0.40 to 6				
00.39	Current loop I gain		After entering of R and L at #5.17 and 5.24 the automatic calculating is started after setting #0.40 to 6				
04.15	Thermal time constant		50	130	270	400	400
04.16	Thermal protection mode		1 or 0 Depending on application				
00.07	Speed controller P gain	1/rad s-1	0,005	0,005	0,01	0,01	0,01
00.08	Speed controller I gain	1/rad	1,00	1,00	1,00	1,00	1,00
00.09	Speed controller D gain	s	0	0	0	0	0
Data for ratio 21							
04.05	Motoring current limit	%	340	450	340	750	270
04.06	Regen current limit	%	340	450	340	750	270
04.07	Symmetrical current limit	%	340	450	340	750	270
Data for ratio 31							
04.05	Motoring current limit	%	290	450	290	650	270
04.06	Regen current limit	%	290	450	290	650	270
04.07	Symmetrical current limit	%	290	450	290	650	270

5 Parameter list TPM 600V ratios 61/91

The following table contains all of the parameters that are required for the initial start-up of a TPM motor-gear unit from WITTENSTEIN motion control together with a Unidrive SP. When the TPM and the servo amplifier are properly connected, these parameters guarantee that the TPM can be operated without load with speed control. Based on these default settings, the dynamics of the speed controller can be optimised depending on the application.
Data for combinations not shown here are available on demand.

Parameter	Parameter name	Unit	TPM004	TPM010	TPM025	TPM050	TPM110
00.41	Maximum switching frequency	kHz	16	16	16	16	16
00.42	No. of motor poles		8	8	12	12	12
00.46	Motor rated current	A	0,5	0,7	1,8	2,6	5,6
00.48	Operating mode selector		SERVO	SERVO	SERVO	SERVO	SERVO
01.06	Maximum reference clamp	RPM	7000	7000	6000	5000	4500
05.08	Rated speed	RPM	6000	6450	5900	4562	3500
05.17	Stator resistance	Ohm	61,1	44,2	9,2	4,5	0,36
05.24	Transient inductance	mH	27,6	30,5	12,5	12,5	2,4
05.32	Motor torque per amp, Kt	Nm/A	0,45	0,77	0,76	1,02	0,91
00.38	Current loop P gain		After entering of R and L at #5.17 and 5.24 the automatic calculating is started after setting #0.40 to 6				
00.39	Current loop I gain		After entering of R and L at #5.17 and 5.24 the automatic calculating is started after setting #0.40 to 6				
04.15	Thermal time constant		50	120	200	400	400
04.16	Thermal protection mode		1 or 0 Depending on application				
00.07	Speed controller P gain	1/rad s-1	0,005	0,005	0,01	0,01	0,01
00.08	Speed controller I gain	1/rad	1,00	1,00	1,00	1,00	1,00
00.09	Speed controller D gain	s	0	0	0	0	0
Data for ratio 61							
04.05	Motoring current limit	%	250	350	390	530	660
04.06	Regen current limit	%	250	350	390	530	660
04.07	Symmetrical current limit	%	250	350	390	530	660
Data for ratio 91							
04.05	Motoring current limit	%	170	220	260	370	430
04.06	Regen current limit	%	170	220	260	370	430
04.07	Symmetrical current limit	%	170	220	260	370	430

6 Parameter list TPMA 600V ratios 110 / 154 / 220

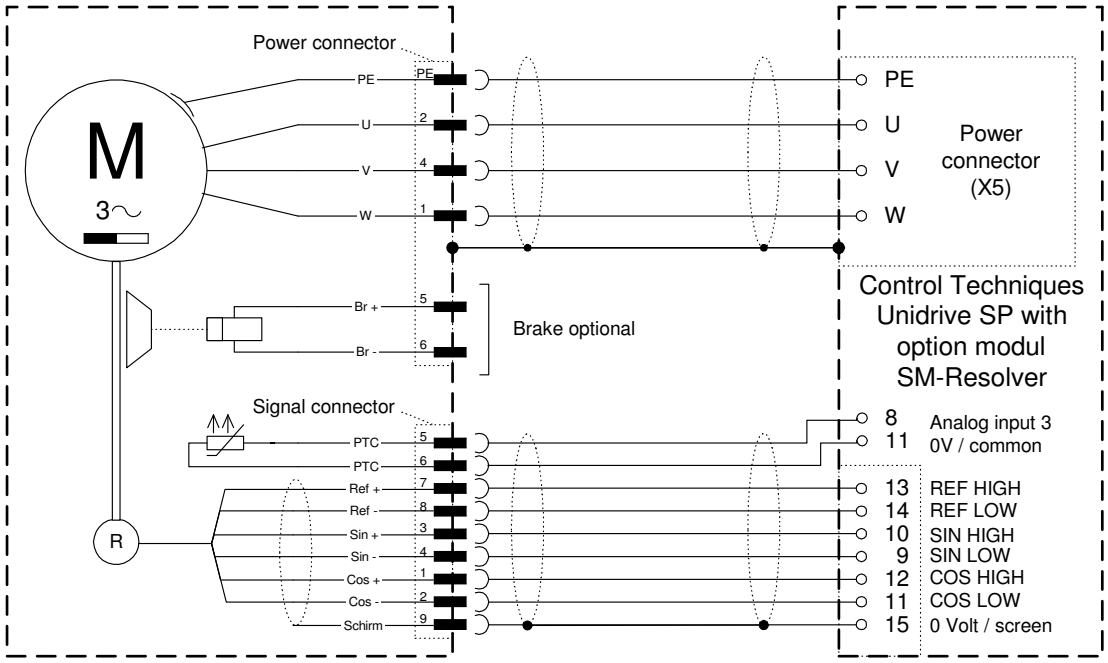
The following table contains all of the parameters that are required for the initial start-up of a TPM motor-gear unit from WITTENSTEIN motion control together with a Unidrive SP. When the TPM and the servo amplifier are properly connected, these parameters guarantee that the TPM can be operated without load with speed control. Based on these default settings, the dynamics of the speed controller can be optimised depending on the application.
Data for combinations not shown here are available on demand.

Parameter	Parameter name	Unit	TPM025	TPM050	TPM110
00.41	Maximum switching frequency	kHz	16	16	16
00.42	No. of motor poles		12	12	12
00.46	Motor rated current	A	1,8	2,6	5,6
00.48	Operating mode selector		SERVO	SERVO	SERVO
01.06	Maximum reference clamp	RPM	6000	5000	4500
05.08	Rated speed	RPM	4200	4200	3300
05.17	Stator resistance	Ohm	9,2	4,5	0,36
05.24	Transient inductance	mH	12,5	12,5	2,4
05.32	Motor torque per amp, Kt	Nm/A	0,76	1,02	0,91
00.38	Current loop P gain		After entering of R and L at #5.17 and 5.24 the automatic calculating is started after setting #0.40 to 6		
00.39	Current loop I gain		After entering of R and L at #5.17 and 5.24 the automatic calculating is started after setting #0.40 to 6		
04.15	Thermal time constant		180	400	400
04.16	Thermal protection mode		1 or 0 Depending on application		
00.07	Speed controller P gain	1/rad s-1	0,01	0,01	0,01
00.08	Speed controller I gain	1/rad	1,00	1,00	1,00
00.09	Speed controller D gain	s	0	0	0
Data for ratio 110					
04.05	Motoring current limit	%	390	530	740
04.06	Regen current limit	%	390	530	740
04.07	Symmetrical current limit	%	390	530	740
Data for ratio 154					
04.05	Motoring current limit	%	300	430	510
04.06	Regen current limit	%	300	430	510
04.07	Symmetrical current limit	%	300	430	510
Data for ratio 220					
04.05	Motoring current limit	%	200	270	340
04.06	Regen current limit	%	200	270	340
04.07	Symmetrical current limit	%	200	270	340

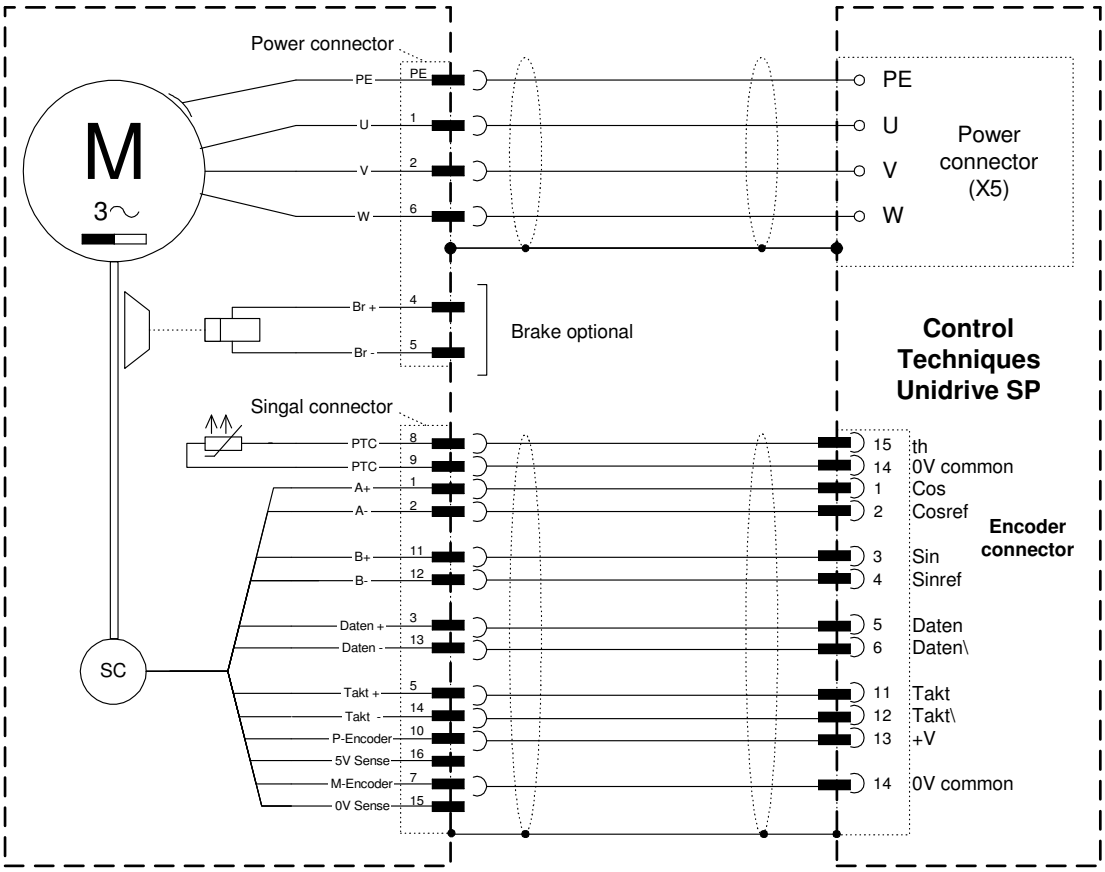
7 Connection schematic TPM / TPMA

For detailed information about cable design and screening the documentation of the drive manufacturer has to be consulted.
The parameter for the motor feedback has to be entered **before** connecting the motor to the drive.
If you enter wrong parameters the encoder or the drive may be damaged.

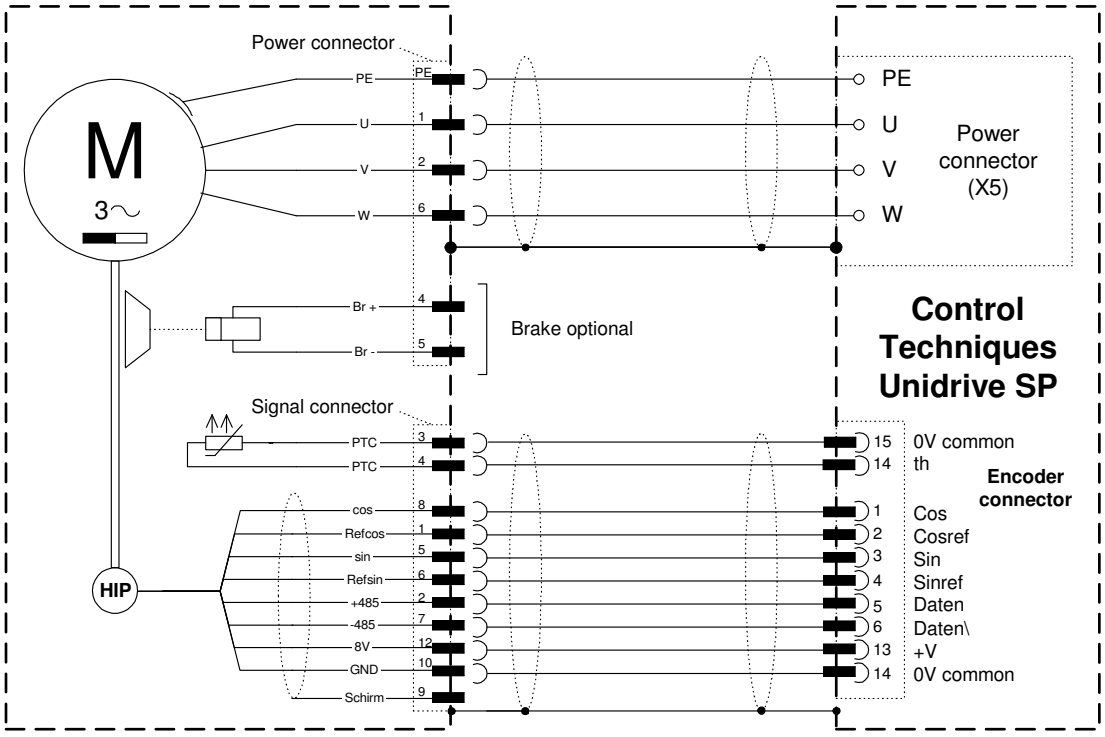
7.1 TPM / TPMA with resolver feedback



7.2 TPM / TPMA with absolute rotary encoder Heidenhain EnDat ECN 1113 / EQN 1125 / ECN 1313 / EQN 1325



7.3 TPM / TPMA with absolute rotary encoder Stegmann Hiperface SRS50 / SRM50



8 Assignment TPM(A) ⇔ servo amplifier ⇔ cable set

8.1 TPM / TPMA with resolver feedback

TPM(A) type			controller		WMC Article code of power- (L) and feedback cable (S)													
feed-back	size	i	recommendation WMC [1]		5m		10m		15m		20m		25m		30m		40m	
			320V	600V	L	S	L	S	L	S	L	S	L	S	L	S	L	S
Resolver	TPM 004	021, 031, 061, 091	-	SP1401	4000 3876	4000 3880	4000 3877	4000 3881	4000 3878	4000 3882	4000 3879	4000 3883	4000 6169	4000 7635	4000 6093	4000 7636	4000 7678	4000 7637
	TPM 010	021, 031	-	SP1402														
		061, 091	-	SP1401														
	TPM(A) 025	021, 031	-	SP1404														
		061, 110	-	SP1403														
		091, 154		SP1402														
		220	-	SP1401														
	TPM(A) 050	91	-	SP1404														
		220	-	SP1403														
		061, 110, 154	-	SP1405	4000 6328		4000 6329		4000 6330		4000 6331		4000 7688		4000 7689		4000 7690	
		021, 031	-	SP2403														
	TPM(A) 110	021, 031, 154	-	SP2402														
		61, 110		SP2403														
		91, 220	-	SP2401														

[1] WMC recommendation is based on use of a power stage with maximal PWM-frequency. Please refer to WMC or controller manufactor to select optimized controller size for the application. Possibly you are a smaller controller.

power- and signal cable to connect on motors with resolver feedback

all cable complete and for dynamic laying

power TPM(A) 004-025 and TPM(A) >= 61	KABELL-TPM_-xxSTD_-RES015-STG	design power cable:	4 x 1,5mm2 + 2 x (2 x 1mm2), diameter 12,2mm, min. bending radius 122mm
power TPM050 i=21/31 TPM(A) 110	KABELL-TPM_-xxSTD_-RES025-STG	design power cable:	4 x 2,5mm2 + 2 x (2 x 1mm2), diameter 15,1mm, min. bending radius 151mm
feedback	KABELS-TPM_-xxCTE_-RES000-STG	design feedback cable:	4 x (2 x 0,25mm2) + 2 x 1mm2, diameter 8,8mm; min. bending radius 88mm
	(xx = cable length according to table)		

8.2 TPM / TPMA with absolute rotary encoder Heidenhain ECN1113 / EQN 1125 / ECN 1313 / EQN 1325

TPM(A) type			controller		WMC Article code of power- (L) and feedback cable (S)													
feed-back	size	i	recommendation WMC [1]		5m		10m		15m		20m		25m		30m		40m	
			320V	600V	L	S	L	S	L	S	L	S	L	S	L	S	L	S
Absolut single-/multiturn encoder with **EnDat**	TPM 004	021, 031, 061, 091	-	SP1401	4000 5465	4001 1028	4000 5466	4001 1029	4000 5467	4001 1030	4000 5468	4001 1031	4000 6054	4001 1032	4000 7679	4001 1033	4000 7328	4001 1034
	TPM 010	021, 031	-	SP1402														
		061, 091	-	SP1401														
	TPM(A) 025	021, 031	-	SP1404														
		061, 110	-	SP1403														
		091, 154		SP1402														
		220	-	SP1401														
	TPM(A) 050	91	-	SP1404														
		220	-	SP1403														
		061, 110, 154	-	SP1405	4000 6830		4000 6831		4000 6832		4000 6833		4000 7692		4000 7693		4000 7694	
		021, 031	-	SP2403														
	TPM(A) 110	021, 031, 154	-	SP2402														
		61, 110		SP2403														
		91, 220	-	SP2401														

[1] WMC recommendation is based on use of a power stage with maximal PWM-frequency. Please refer to WMC or controller manufactor to select optimized controller size for the application. Possibly you are a smaller controller.

power- and feedback cable to connect on motors with absolut EnDat feedback ECN1313 / EQN1325 resp. ECN 1113 / EQN 1125

all cable complete and for dynamic laying

Cable			
power TPM(A) 004-025 and TPM(A) >= 61	KABELL-TPM_-xxSTD_-END015-STG	design power cable:	4 x 1,5mm2 + 2 x 1mm2, diameter 12mm, min. bending radius 120mm
power TPM050 i=21/31 TPM(A) 110	KABELL-TPM_-xxSTD_-END025-STG	design power cable:	4 x 2,5mm2 + 2 x 1mm2, diameter 15,1mm, min. bending radius 151mm
feedback	KABELS-TPM_-xxCTSP-END000-STG	design feedback cable:	3 x (2 x 0,14mm2) + 4 x 0,14mm2 + 4 x 0,25mm2 + 2 x 0,5mm2; diameter 10mm min. bending radius 100mm
	(xx = cable length according to table)		

8.3 TPM / TPMA with absolute rotary encoder Stegmann SRS 50 / SRM 50

TPM type			controller		WMC Article code of power- (L) and feedback cable (S)													
feed-back	size	i	recommendation WMC [1]		5m		10m		15m		20m		25m		30m		40m	
			320V	600V	L	S	L	S	L	S	L	S	L	S	L	S	L	S
Absolut single-/multiturn encoder with Stegmann **Hiperface**	TPM 004	021, 031, 061, 091	-	SP1401	4000 5465	4001 1019	4000 5466	4001 1021	4000 5467	4001 1022	4000 5468	4001 1023	4000 6054	4001 1024	4000 7679	4001 1025	4000 7328	4001 1026
	TPM 010	021, 031	-	SP1402														
		061, 091	-	SP1401														
	TPM(A) 025	021, 031	-	SP1404														
		061, 110	-	SP1403														
		091, 154		SP1402														
		220	-	SP1401														
	TPM(A) 050	91	-	SP1404														
		220	-	SP1403														
		061, 110, 154	-	SP1405	4000 6830		4000 6831		4000 6832		4000 6833		4000 7692		4000 7693		4000 7694	
		021, 031	-	SP2403														
	TPM(A) 110	021, 031, 154	-	SP2402														
		61, 110		SP2403														
		91, 220	-	SP2401														

[1] WMC recommendation is based on use of a power stage with maximal PWM-frequency. Please refer to WMC or controller manufactor to select optimized controller size for the application. Possibly you are a smaller controller.

power- and feedback cable to connect on motors with absolut Hiperface feedback SRS 50 SRM 50

all cable complete and for dynamic laying

power TPM(A) 004-025 and TPM(A) >= 61	KABELL-TPM_-xxSTD_-END015-STG	design power cable:	4 x 1,5mm2 + 2 x 1mm2, diameter 12mm, min. bending radius 120mm
power TPM050 i=21/31 TPM(A) 110	KABELL-TPM_-xxSTD_-END025-STG	design power cable:	4 x 2,5mm2 + 2 x 1mm2, diameter 15,1mm, min. bending radius 151mm
feedback	KABELS-TPM_-xxCTSP-HIP000-STG	design feedback cable:	5 x (2 x 0,25mm2), diameter 9,0 mm; min. bending radius 90mm
	(xx = cable length according to table)		