WITTENSTEIN motion control

Quick Startup Guide

TPM(A)
004 – 110

SEIDEL
SERVOSTAR 600

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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.

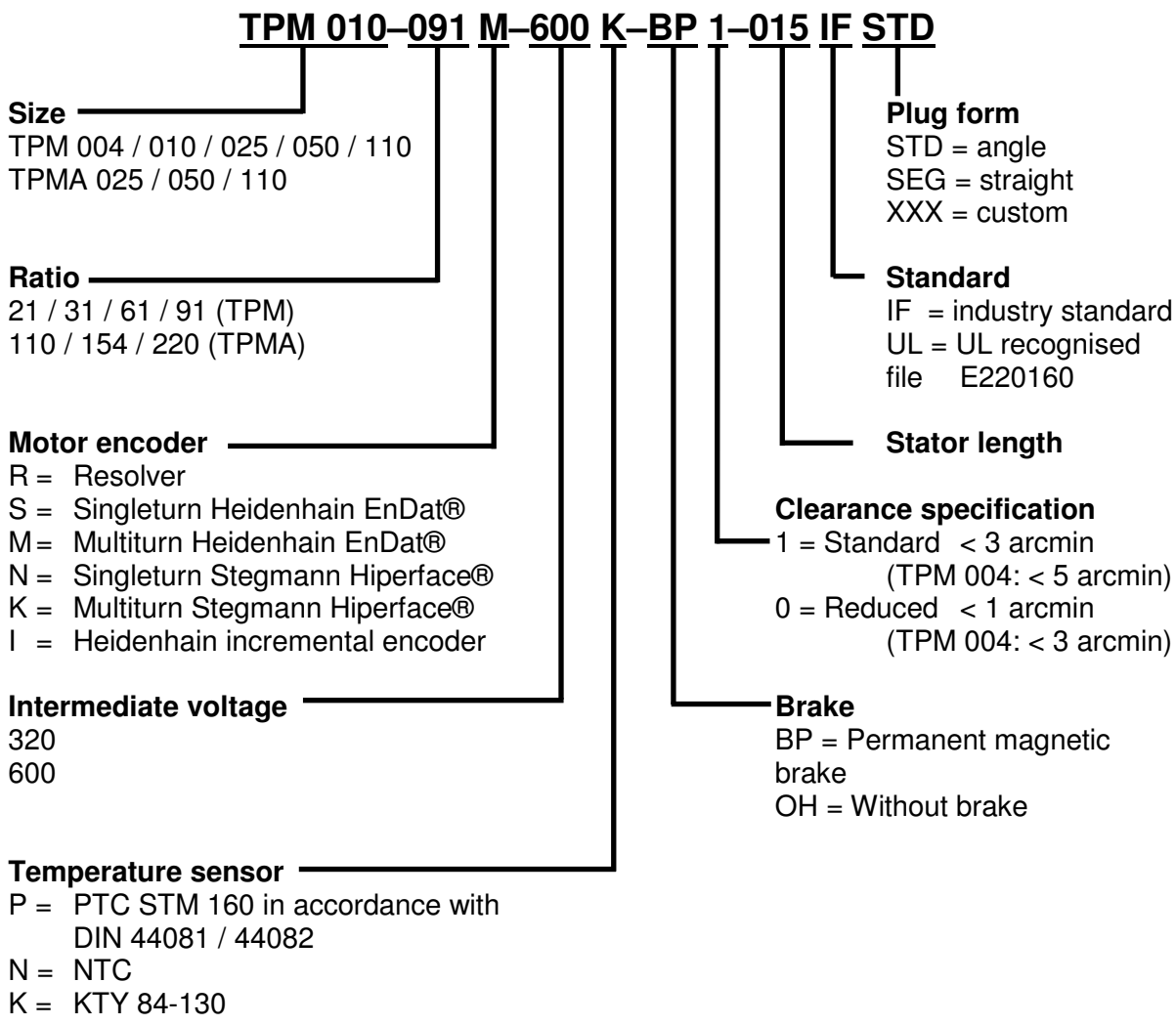
Observe all of the national safety regulations and guidelines of the country where the device is being used. All transportation, installation, start-up, and service work is to be performed by qualified technicians. Qualified technicians are those who are completely familiar with the assembly, installation, 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

Please select the input parameters corresponding to the nameplate values of your TPM.



3 Parameter list TPM / TPMA ⇔ Servostar 600

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 Seidel Servostar 600. When the TPM and the servo amplifier are properly connected, these parameters guarantee that the TPM can be operated without load in speed control. Based on these default settings, the dynamics of the speed loop can be optimized depending on the application.

3.1 Selection of the motor feedback and encoder offset

For the selection of the motor feedback and the encoder offset the following inputs must be done:

1. Open the screen **Terminal** in the Drive software
2. Depending on the motor feedback enter the following commands:
   Resolver: **MRESPOLES 2**
   FBTYPE 0
   Heidenhain EnDat: **FBTYPE 4**
   Stegmann Hiperface: **FBTYPE 2**
   After input of **FBTYPE <WERT>,** please confirm the message „Save to EEPROM and reset?“ with „YES“
3. After the restart open the Screen **Terminal** and enter the encoder offset with the command **MPHASE <OFFSET>**
   Instead of <OFFSET> enter he appropriate value of the following parameter list
4. For TPM with **Resolver** you must save the offset in the amplifier with the input of the command **SAVE**
   For TPM with **EnDat** you must store the offset to the encoder with the command **HSAVE**
   For TPM with **Hiperface** you must store the offset to the encoder with the two commands **HSAVE ERASE** and **HSAVE**
5. Restart the amplifier with the input of **COLDSTART**

3.2 TPM with 320 V DC-bus

Screen Page	Parameter DC-Bus Voltage	TPM004	TPM010	TPM025 320 V	TPM050	TPM110
Feedback	Feedback Type	Resolver				
	No. of Poles	2				
	Offset	90	90	270	270	270
	Bandwith	600				
	Feedback Type	EnDat				
	Offset	90	90	90	90	90
	Feedback Type	HIPERFACE				
	Offset	150	150	150	150	150
Speed	Speed Limit [rpm]	7000	7000	6000	5000	4500
	Rotary Direction	Positive				
	Overspeed [rpm]	7250	7250	6250	5250	4750
	Kp	0.3	0.3	0.3	0.4	0.5
	Tn [ms]	10	10	10	10	10
	PID-T2	0.2				
	T-Tacho	0.6				
Ratio 21 / 31 Stator Length		030	030	045	060	075
Motor	Number - Name	0-NN	0-NN	0-NN	0-NN	0-NN
	No. of Poles	8	8	12	12	12
	I0 [Arms]	1.5	1.7	8.7	23.9	18.0
	I0max @ i = 21 [Arms]	4.2	7.3	24.2	42.0	42.0
	I0max @ i = 31 [Arms]	3.7	5.7	19.7	42.0	42.0
	L [mH]	10.2	12.2	2.5	1.0	2.4
	Max Speed [rpm]	7000	7000	6000	5000	4500
	Holding Brake	with / without				
Current	Irms [Arms]	1.5	1.7	8.7	23.9	18.0
	Ipeak @ i = 21 [Arms]	4.2	7.3	24.2	42.0	42.0
	Ipeak @ i = 31 [Arms]	3.7	5.7	19.7	42.0	42.0
	Kp [1]	0.77	0.92	0.88	0.35	1.20
	Tn [ms]	0.4	0.6			
Ratio 61 / 91 Stator Length		015	015	015	015	060
Motor	Number - Name	0-NN	0-NN	0-NN	0-NN	0-NN
	No. of Poles	8	8	12	12	12
	I0 [Arms]	1.2	1.2	3.7	5.2	23.9
	I0max @ i = 61 [Arms]	2.5	3.5	12.9	22.2	42.0
	I0max @ i = 91 [Arms]	1.7	2.4	8.7	14.9	32.1
	L [mH]	9.1	13.1	5.2	6.1	1.0
	Max Speed [rpm]	7000	7000	6000	5000	4500
	Holding Brake	with / without				
Current	Irms [Arms]	1.2	1.2	3.7	5.2	23.9
	Ipeak @ i = 61 [Arms]	2.5	3.5	12.9	22.2	42.0
	Ipeak @ i = 91 [Arms]	1.7	2.4	8.7	14.9	32.1
	Kp [1]	0.34	0.49	0.78	1.53	0.50
	Tn [ms]	0.4	0.6			

[1] The value Kp of the current controller is acquired in addiction of the recommended WMC amplifier size.
You find the recommended amplifier size under the topic „Assignment TPM – servo amplifier – cable set“.
For the usage of a different amplifier size you can calculate the value with the formula:
Kp = 25 * Nominal current amplifier [A] * Inductance [mH] / 1000

3.3 TPM with 600 V DC-bus

Screen Page	Parameter DC-Bus Voltage	TPM004	TPM010	TPM025 600 V	TPM050	TPM110
Feedback	Feedback Type	Resolver				
	No. of Poles	2				
	Offset	90	90	270	270	270
	Bandwith	600				
	Feedback Type	EnDat				
	Offset	90	90	90	90	90
	Feedback Type	HIPERFACE				
	Offset	150	150	150	150	150
Speed	Speed Limit [rpm]	7000	7000	6000	5000	4500
	Rotary Direction	Positive				
	Overspeed [rpm]	7250	7250	6250	5250	4750
	Kp	0.2	0.3	0.3	0.4	0.5
	Tn [ms]	10	10	10	10	10
	PID-T2	0.2				
	T-Tacho	0.6				
Ratio 21 / 31 Stator Length		030	030	045	060	075
Motor	Number - Name	0-NN	0-NN	0-NN	0-NN	0-NN
	No. of Poles	8	8	12	12	12
	I0 [Arms]	0.8	1.3	4.4	15.3	12.1
	I0max @ i = 21 [Arms]	2.4	5.0	10.6	36.0	26.2
	I0max @ i = 31 [Arms]	2.1	4.5	10.6	31.7	26.2
	L [mH]	30.6	20.3	10.0	2.4	5.4
	Max Speed [rpm]	7000	7000	6000	5000	4500
	Holding Brake	with / without				
Current	Irms [Arms]	0.8	1.3	4.4	15.3	12.1
	Ipeak @ i = 21 [Arms]	2.4	5.0	10.6	36.0	26.2
	Ipeak @ i = 31 [Arms]	2.1	4.5	10.6	31.7	26.2
	Kp [1]	1.15	1.52	1.50	0.84	1.89
	Tn [ms]	0.6				
Ratio 61 / 91 Stator Length		015	015	015	015	060
Motor	Number - Name	0-NN	0-NN	0-NN	0-NN	0-NN
	No. of Poles	8	8	12	12	12
	I0 [Arms]	0.6	0.8	2.3	3.6	15.3
	I0max @ i = 61 [Arms]	1.2	2.5	7.0	13.7	28.9
	I0max @ i = 91 [Arms]	0.8	1.6	5.1	9.9	19.4
	L [mH]	27.6	30.5	12.5	12.5	2.4
	Max Speed [rpm]	7000	7000	6000	5000	4500
	Holding Brake	with / without				
Current	Irms [Arms]	0.6	0.8	2.3	3.6	15.3
	Ipeak @ i = 61 [Arms]	1.2	2.5	7.0	13.7	28.9
	Ipeak @ i = 91 [Arms]	0.8	1.6	5.1	9.9	19.4
	Kp [1]	1.04	1.14	0.94	1.88	0.60
	Tn [ms]	0.6				

[1] The value Kp of the current controller is acquired in addiction of the recommended WMC amplifier size.
You find the recommended amplifier size under the topic „Assignment TPM – servo amplifier – cable set“.
For the usage of a different amplifier size you can calculate the value with the formula:
Kp = 25 * Nominal current amplifier [A] * Inductance [mH] / 1000

3.4 TPMA with 320 V DC-bus

Screen Page	Parameter	TPMA025	TPMA050	TPMA110
	DC-Bus Voltage		320	
Feedback	Feedback Type		Resolver	
	No. of Poles		2	
	Offset	270	270	270
	Bandwith		600	
	Feedback Type		EnDat	
	Offset	90	90	90
	Feedback Type		HIPERFACE	
	Offset	150	150	150
Speed	Speed Limit [rpm]	6000	5000	4500
	Rotary Direction		Positive	
	Overspeed [rpm]	6250	5250	4750
	Kp	0.3	0.4	0.5
	Tn [ms]	10	10	10
	PID-T2		0.2	
	T-Tacho		0.6	
Ratio 110 / 154 / 220 Stator Length		015	015	060
Motor	Number - Name	0-NN	0-NN	0-NN
	No. of Poles	12	12	12
	I0 [Arms]	3.7	5.2	23.9
	I0max @ i = 110 [Aeff]	10.8	19.6	61.6
	I0max @ i = 154 [Aeff]	8.4	16.0	42.6
	I0max @ i = 220 [Aeff]	5.7	9.8	28.3
	L [mH]	5.2	6.1	1.0
	Max Speed [rpm]	6000	5000	4500
	Holding Brake		with / without	
Current	Irms [Arms]	3.7	5.2	23.9
	Ipeak @ i = 110 [Aeff]	10.8	19.6	61.6
	Ipeak @ i = 154 [Aeff]	8.4	16.0	42.6
	Ipeak @ i = 220 [Aeff]	5.7	9.8	28.3
	Kp [1]	0.78	1.53	0.50
	Tn [ms]		0.6	

[1] The value Kp of the current controller is acquired in addiction of the recommended WMC amplifier size.
You find the recommended amplifier size under the topic „Assignment TPM – servo amplifier – cable set“.
For the usage of a different amplifier size you can calculate the value with the formula:
Kp = 25 * Nominal current amplifier [A] * Inductance [mH] / 1000

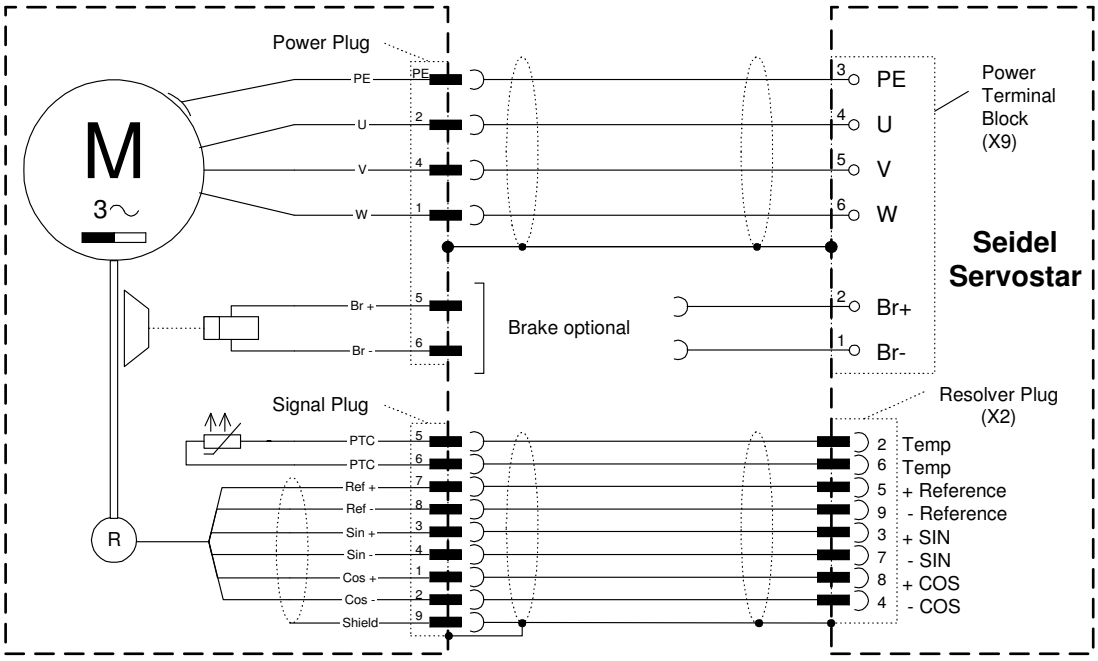
3.5 TPMA with 600 V DC-bus

Screen Page	Parameter	TPMA025	TPMA050	TPMA110
	DC-Bus Voltage		600 V	
Feedback	Feedback Type		Resolver	
	No. of Poles		2	
	Offset	270	270	270
	Bandwith		600	
	Feedback Type		EnDat	
	Offset	90	90	90
	Feedback Type		HIPERFACE	
	Offset	150	150	150
Speed	Speed Limit [rpm]	6000	5000	4500
	Rotary Direction		Positive	
	Overspeed [rpm]	6250	5250	4750
	Kp	0.3	0.4	0.5
	Tn [ms]	10	10	10
	PID-T2		0.2	
	T-Tacho		0.6	
Ratio 110 / 154 / 220				
Stator Length		015	015	060
Motor	Number - Name	0-NN	0-NN	0-NN
	No. of Poles	12	12	12
	I0 [Arms]	2.3	3.6	15.3
	I0max @ i = 110 [Aeff]	7.0	13.7	41.4
	I0max @ i = 154 [Aeff]	5.4	11.2	28.7
	I0max @ i = 220 [Aeff]	3.6	7.0	19.2
	L [mH]	12.5	12.5	2.4
	Max Speed [rpm]	6000	5000	4500
	Holding Brake		with / without	
Current	Irms [Arms]	2.3	3.6	15.3
	Ipeak @ i = 110 [Aeff]	7.0	13.7	41.4
	Ipeak @ i = 154 [Aeff]	5.4	11.2	28.7
	Ipeak @ i = 220 [Aeff]	3.6	7.0	19.2
	Kp [1]	0.94	1.88	0.60
	Tn [ms]		0.6	

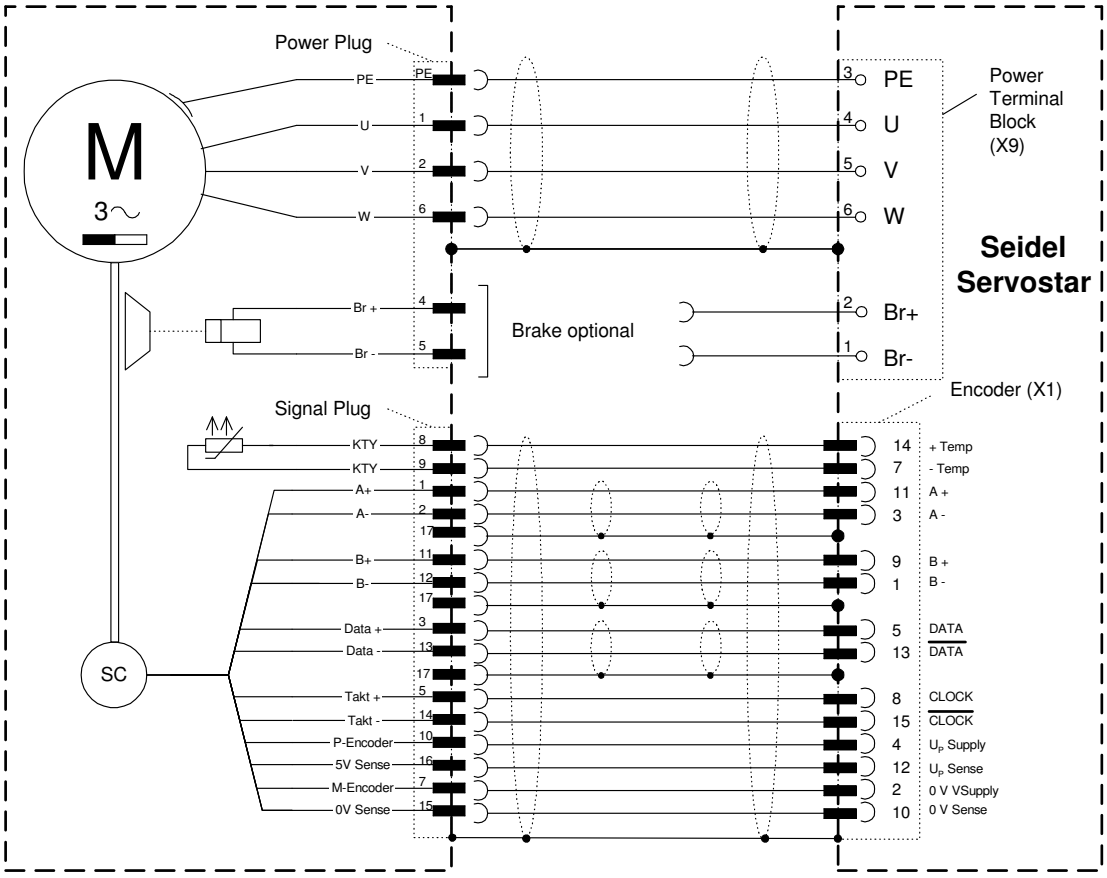
[1] The value Kp of the current controller is acquired in addiction of the recommended WMC amplifier size. You find the recommended amplifier size under the topic „Assignment TPM – servo amplifier – cable set“. For the usage of a different amplifier size you can calculate the value with the formula:
Kp = 25 * Nominal current amplifier [A] * Inductance [mH] / 1000

4 Connection schematic TPM ⇔ Servostar 600

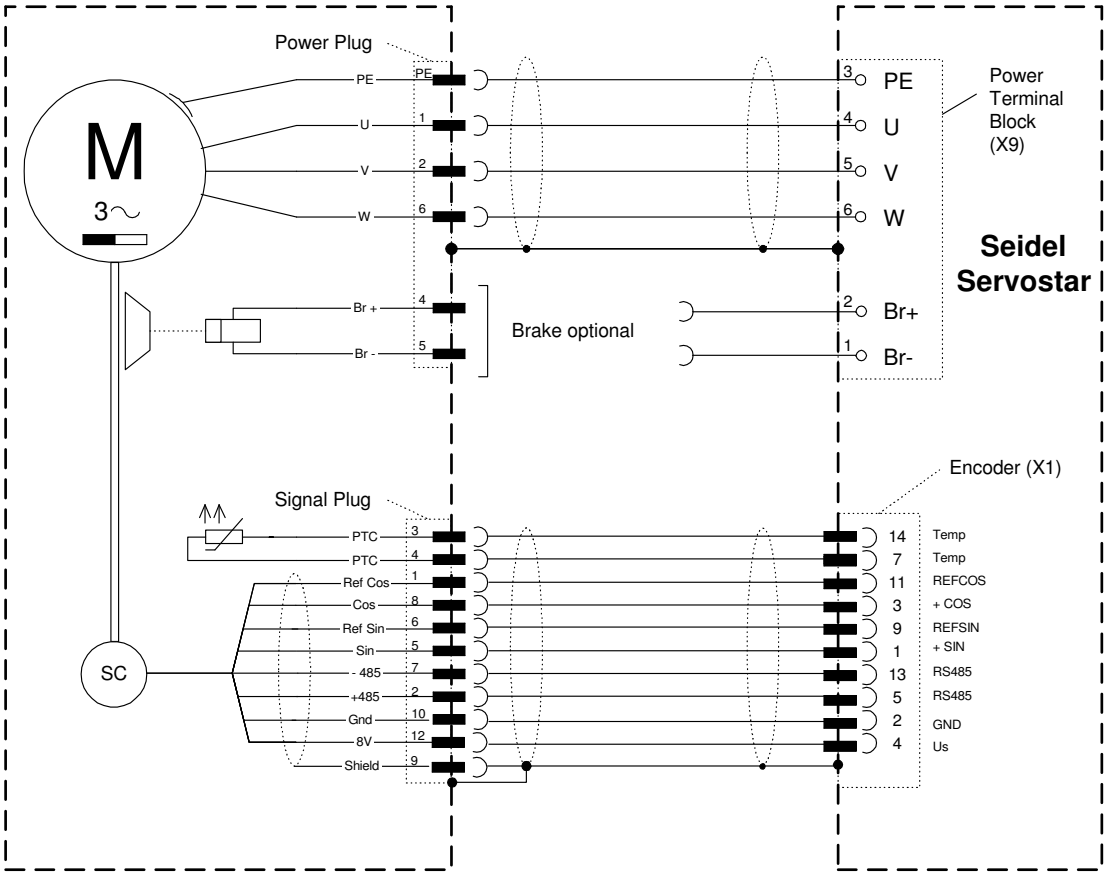
4.1 TPM with Resolver-Feedback



4.2 TPM with absolute rotary encoder Heidenhain ECN 1313 / EQN 1325



4.3 TPM with absolute rotary encoder Stegmann SRS / SRM 050



5 Assignment TPM ⇔ servo amplifier ⇔ cable set

5.1 TPM with Resolver-Feedback

TPM type			Controller		Code of power- (L) and signal cable (S)															
Feed-	Size	i	WMC recommendation [1]		5m		10m		15m		20m		25m		30m		40m		50m	
back			320V	600V	L	S	L	S	L	S	L	S	L	S	L	S	L	S	L	S
Resolver	TPM 004	021	Servostar 603	Servostar 601	4000 3876	4000 6440	4000 3877	4000 6456	4000 3878	4000 6505	4000 3879	4000 6602	4000 6169	4000 7659	4000 6093	4000 7660	4000 7678	4000 7661	4000 7452	4000 7662
		031	Servostar 603	Servostar 601																
		061	Servostar 601	Servostar 601																
		091	Servostar 601	Servostar 601																
	TPM 010	021	Servostar 603	Servostar 603																
		031	Servostar 603	Servostar 603																
		061	Servostar 601	Servostar 601																
		091	Servostar 601	Servostar 601																
	TPM 025	021	Servostar 614	Servostar 606																
		031	Servostar 610	Servostar 606																
		061	Servostar 606	Servostar 603																
		091	Servostar 603	Servostar 603																
	TPM 050	021	Servostar 614	Servostar 614																
		031	Servostar 614	Servostar 614																
		061	Servostar 610	Servostar 606																
		091	Servostar 606	Servostar 603																
	TPM 110	021	Servostar 620	Servostar 614	4000 6328		4000 6329		4000 6330		4000 6331		4000 7688		4000 7689		4000 7690		4000 7691	
		031	Servostar 620	Servostar 614																
		061	Servostar 620	Servostar 614																
		091	Servostar 614	Servostar 610																

[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 able to use a smaller controller.

Power and signal cable to connect on motors with resolver

All cable complete and for dynamic laying

Power cable TPM 004-050	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 cable TPM 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
Signal cable	KABELS-TPM_-xxSEI_-RES000-STG	Design signal cable:	4 x (2 x 0,25mm2) + 2 x 1mm2, diameter 8,8mm; min. bending radius 88mm
	(xx = cable length)		

5.2 TPM with absolute rotary encoder Heidenhain ECN 1313 / EQN 1325

TPM type			Controller		Code of power- (L) and signal cable (S)															
Feed-back	Size	i	WMC recommendation [1]		5m		10m		15m		20m		25m		30m		40m		50m	
			320V	600V	L	S	L	S	L	S	L	S	L	S	L	S	L	S	L	S
Absolute single-/multiturn transmitter with **EnDat**	TPM004	021	Servostar 603	Servostar 601	4000 5465	4000 8708	4000 5466	4000 8709	4000 5467	4000 8710	4000 5468	4000 8711	4000 6054	4000 8712	4000 7679	4000 8713	4000 7328	4000 8714	4000 5920	4000 8715
		031	Servostar 603	Servostar 601																
		061	Servostar 601	Servostar 601																
		091	Servostar 601	Servostar 601																
	TPM 010	021	Servostar 603	Servostar 603																
		031	Servostar 603	Servostar 603																
		061	Servostar 601	Servostar 601																
		091	Servostar 601	Servostar 601																
	TPM 025	021	Servostar 614	Servostar 606																
		031	Servostar 610	Servostar 606																
		061	Servostar 606	Servostar 603																
		091	Servostar 603	Servostar 603																
	TPM 050	021	Servostar 614	Servostar 614																
		031	Servostar 614	Servostar 614																
		061	Servostar 610	Servostar 606																
		091	Servostar 606	Servostar 603																
	TPM 110	021	Servostar 620	Servostar 614	4000 6830		4000 6831		4000 6832		4000 6833		4000 7692		4000 7693		4000 7694		4000 7695	
		031	Servostar 620	Servostar 614																
		061	Servostar 620	Servostar 614																
		091	Servostar 614	Servostar 610																

[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 able to use a smaller controller.

Power and signal cable to connect on motors with absolut EnDat feedback ECN1313 / EQN1325

All cable complete and for dynamic laying

Power cable TPM 004-050	KABELL-TPM_-xxSTD_-END015-STG	Design power cable:	4 x 1,5mm2 + 2 x 1mm2, diameter 12mm, min. bending radius 120mm
Power cable TPM 110	KABELL-TPM_-xxSTD_-END025-STG	Design power cable:	4 x 2,5mm2 + 2 x 1mm2, diameter 15,1mm, min. bending radius 151mm
Signal cable	KABELS-TPM_-xxSEI_-END000-STG	Design signal 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)		

5.3 TPM with absolute rotary encoder Stegmann SRS 050 / SRM 050

TPM type			Controller		Code of power- (L) and signal cable (S)															
Feed-	Size	i	WMC recommendation [1]		5m		10m		15m		20m		25m		30m		40m		50m	
back			320V	600V	L	S	L	S	L	S	L	S	L	S	L	S	L	S	L	S
Absolute single-/multiturn transmitter with **HIPERFACE**	TPM 004	021	Servostar 603	Servostar 601	4000 5465	4000 8723	4000 5466	4000 8724	4000 5467	4000 8725	4000 5468	4000 8726	4000 6054	4000 8727	4000 7679	4000 8728	4000 7328	4000 8729	4000 5920	4000 8730
		031	Servostar 603	Servostar 601																
		061	Servostar 601	Servostar 601																
		091	Servostar 601	Servostar 601																
	TPM 010	021	Servostar 603	Servostar 603																
		031	Servostar 603	Servostar 603																
		061	Servostar 601	Servostar 601																
		091	Servostar 601	Servostar 601																
	TPM 025	021	Servostar 614	Servostar 606																
		031	Servostar 610	Servostar 606																
		061	Servostar 606	Servostar 603																
		091	Servostar 603	Servostar 603																
	TPM 050	021	Servostar 614	Servostar 614																
		031	Servostar 614	Servostar 614																
		061	Servostar 610	Servostar 606																
		091	Servostar 606	Servostar 603																
	TPM 110	021	Servostar 620	Servostar 614	4000 6830		4000 6831		4000 6832		4000 6833		4000 7692		4000 7693		4000 7694		4000 7695	
		031	Servostar 620	Servostar 614																
		061	Servostar 620	Servostar 614																
		091	Servostar 614	Servostar 610																

[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 able to use a smaller controller.

Power and signal cable to connect on motors with Stegmann HIPERFACE

All cable complete and for dynamic laying

Power cable TPM 004-050	KABELL-TPM_-xxSTD_-END015-STG	Design power cable:	4 x 1,5mm2 + 2 x 1mm2, diameter 12mm, min. bending radius 120mm
Power cable TPM 110	KABELL-TPM_-xxSTD_-END025-STG	Design power cable:	4 x 2,5mm2 + 2 x 1mm2, diameter 15,1mm, min. bending radius 151mm
Signal cable	KABELS-TPM_-xxSEI_-HIP000-STG	Design signal cable:	4 x (2 x 0,25mm2) + 2 x 1mm2, diameter 8,8mm; min. bending radius 88mm
	(xx = cable length)		