



Manual commissioning

HFI – MM Frequency inverter



Typ: HFI – MM Frequency inverter

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2 Preface

The system consists of a standard motor with an attached frequency converter. For distribution the frequency converter is already mounted and connected with the motor. The electrical connection is made directly at the frequency converter. In this document the connection and the parameterization for the easy commissioning are shown.

3 Main connection

3.1 Frame size A - C



Figure 3-1: Mains connection BG A - C

The mains cable must be put through the cable gland and the phases L1, L2, L3 for 400 V and the ground wire with the protective earth (PE) contact must be connected to the terminal.

The cable gland serves the cable relief; the PE connection wire must be significantly longer than the other wires.

Terminal No.	Label	Configuration
1	L1	Mains phase 1
2	L2	Mains phase 2
3	L3	Mains phase 3
4	PE	Ground wire



3.2 Frame size D



Figure 3-2: Mains connection BG D

Initially the four screws of the case cap must be screwed off and the cab must be removed.

The mains cable must be put through the cable gland and the phases L1, L2, L3 for 400 V and the ground wire with the protective earth (PE) contact must be connected to the terminal.

The cable gland serves the cable relief; the PE connection wire must be significantly longer than the other wires.

Terminal No.	Label	Configuration
1	L1	Mains phase 1
2	L2	Mains phase 2
3	L3	Mains phase 3
4	PE	Ground wire

Table 2	2: 3x	400V	terminal	connection	X2
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4 Control ports

4.1 Wiring diagram



Figure 4-1: Wiring diagram

The drive controller and the control card are operational after connecting a 400 V AC voltage to terminal L1 to L3.

Alternatively it is possible to commission only the inverter's control card with an external 24 V DC Voltage. However it is not possible to drive the motor without a mains connection.

4.2 Control terminal strip



Figure 4-2: Control terminal strip

The required control wires must be put through the cable glands into the housing. The pin assignment is shown in Figure 4-2.

4.3 Terminal layout

The terminal layout is listed below.

Terminal No.	Label	Configuration
1	СОМ	Center contact Relay 1
2	NO	Normally open contact Relay 1
3	NC	Normally closed contact Relay 1

Table 3-1: Terminal layout X3

Terminal No.	Label	Configuration
1	СОМ	Center contact Relay 2
2	NO	Normally open contact Relay 2
3	NC	Normally closed contact Relay 2

Table 3-2: Terminal layout X4

Terminal No.	Label	Configuration
1	24 V In	External power supply
2	GND	Ground
3	24 V Out	Internal power supply
4	GND	Ground
5	24 V Out	Internal power supply
6	Dig. In 1	Software release signal (Parameter 1.131)
7	Dig. In 2	unassigned
8	Dig. In 3	unassigned
9	Dig. In 4	Fault reset (Parameter 1.180)
10	En-HW	Hardware release signal
11	Dig. Out 1	Error message (Parameter 4.150)
12	Dig. Out 2	unassigned
13	A. Out 020 mA	Actual frequency value (Parameter 4.100)
14	10 V Out	For external voltage divider
15	A. Out 010V	Actual frequency value (Parameter 4.100)
16	A. GND (Ground 10 V)	Ground
17	A. In 1	Actual PID value (Parameter 3.060)
18	A. GND (Ground 10 V)	Ground
19	A. In 2	unassigned
20	A. GND (Ground 10 V)	Ground

Table 4-3: Terminal layout of standard application card

4.4 Connection scheme

For unlocking the modulation the hardware release signal needs to be activated.

Two variants for the hardware release signal are shown below.

4.4.1 Control connection for hardware release signal with internal power supply (1st variant)



Figure 4-4: Control port for hardware release signal with internal power supply

To activate the hardware release signal, the port "En.HW" needs to be connected to the port "24V Out".

4.4.2 Control connection for hardware release signal with external power supply (2nd variant)



Figure 4-5: Control connection for hardware release signal with external power supply

To activate the hardware release signal with an external power supply, the positive pole (24V DC) of the external power supply needs to be connected to "En.HW" and the negative pole to GND.

5 Commissioning

To parameterize the frequency converter, connect the USB parameterization cable to a PC. To establish a connection with the software HMM Start-Up, the correct interface must be chosen (in general the last COM-Port).



Figure 5-1: Interface

After connecting, the following screen appears.



Figure 5-2: Cockpit

As default, the motor specific values are entered and the motor identification was carried out. If you use another motor or the Failure "invalid motor nameplate data" appears, then you have to enter the right motor specific values.

Below is an example for a motor nameplate:

- Motor current: 5,88 A
- Motor power: 3 kW
- Motor speed: 2890 rpm
- Motor frequency: 50 Hz
- Motor voltage: 400 V
- Motor-cosphi: 0,87

COM3 - I	HMM Start-	Up 2.04	4f			
File Device	Selection	Extra	Window	Help		
🔁 Open	F Save	Co	🗐 Innect	i≌ Write	🛍 Read	E Parameter
Tasks	x					
Cock	pit		_	_	_	
Param	eter					
Actual \	/alues					
Erro	or			ΗN	ΊΑ	
Cont	rol					
Oscillos	cope					
Param Actual V Erro Cont Oscillos	eter /alues or rol scope			HN	/DA	

Figure 5-3: Opening the parameter tab

To enter the motor values to frequency inverter's parameters, open the parameter list. Therefore click on "Parameter" as shown in

Figure 5-3.

Parameter	. .						
III Parameters	motor parameter						
🛄 basic parameter		1					
I control mode	Number	Name	Value 1				
process control	33.001	motor type	1: induction motor	Ready			
	33.010	i2t fac.mot.	150 %	Always			
control terminal	33.011	i2t time	30 s	Always			
add.function	33.015	opt.stat.resist.	100 %	Ready			
Field.parameter	33.016	motorphas detect	1: enable	Ready			
	33.031	motor current	5,88 A	Ready			
r motor parameter	33.032	motor power	3 000 W	Ready			
Actual Values	33.034	motor speed	2 890 rpm	Ready			
Error	33.035	motor frequency	50 Hz	Ready			
·	33.050	stator resist.	10,00 Ohm	Ready			
	33.105	leakage induct.	0 H	Ready			
	33.110	motor voltage	400 V	Ready			
	33.111	motor cosphi	0,87	Ready			

Figure 5-4: motor parameter

Afterwards enter the motor values in the tab "motor parameter" and confirm each entry with the green check mark.

The following parameters need to be set:

- 33.031 motor current
- 33.032 motor power
- 33.034 motor speed
- 33.035 motor frequency
- 33.110 motor voltage
- 33.111 motor-cosphi

When the motor specific values are grayed, then you have no permissions. Please contact the manufacturer.

After entering the motor values a motor identification needs to be performed. To start the identification, confirm the fault with the reset button on the right first. Afterwards click on "Device" \rightarrow "Commissioning"

Commissioning

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COM3 V	COM3 Vorführaggregat.kinesys - HMM Start-Up 2.04f									
File Device	Selection	Parameter Extr	a Window	Help						
Dpen	F Save	Connect	Mrite	🛍 Read	III Parameter	E Actual Values	Error	<u>عا</u> Control	Cscilloscope	
Tasks	×	COM3 Vorfüh	nraggregat	.kinesys - Self	Commissioni	ing : HMM Star	t-Up			×
Cock	(pit			The HMM Start-	Up Self Commi	ssioning is a proce	ess that auto	matically sets t	the motor param	eters.
Parall	ieter			It will start the i	nverter and me	asure the connect	ted motor to	identity its par	ameters.	
All Param	eters			This wizard will	guide you throu	ugh this process.				
🔲 🛄 basic par	ameter									
🔲 control m	ode									
🔲 process o	ontrol									
🔲 control te	rminal									
add.funct	ion									
🖽 field.para	meter									
🛔 motor pa	rameter									
🖾 controll.p	aram.									
🖽 brake cho	pper									
🔲 🔠 Data Sets	Different						Back	Next	Cano	el
Actual	Values									
Err	or	3.070	PID std	.by time	0 s				0 s	
Cont	rol	3.071	PID std	.by hyst.	0 %				0 %	
Oscillo		3.072	PID dry	run time	0 s				0 s	
Uscillos	соре	3.073	PID ref	.min	0 %				0 %	,
		3.074	PID ref	.max	100 %				100 %	6

Figure 5-5: Motor identification

Follow the instructions of the wizard.

Parameter All Parameters All Parameters						
		Number	Name	Value 1		
E control mode			name	Vulue 1		
process control	1.	.020	low speed	25 Hz	Always	
	1.	.021	high speed	100 Hz	Always	
🖽 control terminal	1.	.050	deceleration 1	0,1 s	Always	
add.function	1.	.051	acceleration 1	0,1 s	Always	
I field.parameter	1.	100	control mode	1: PID process controlle	Always	
	1.	130	ref.channel	8: PID preset reference	Always	
motor parameter	1.	131	enable software	0: digital input 1	Always	
Actual Values	1.	132	start protect	0: disable	Always	

Figure 5-6: Ramp time

By default the ramp time (value number 1.050 and 1.051) is set to 5 seconds. Depending on the application this variable can be changed to a suitable value.

Parameter							
All Parameters	All Parameters						
🖽 basic parameter		1		1			
control mode	Number	Name	Value 1	Accep			
III and a start and	1.100	control mode	1. I ID process control	Aiways			
process control	1.130	ref.channel	8: PID preset reference	Always			
control terminal	1.131	enable software	0: digital input 1 🛛 🔻				
III add function	1.132	start protect	0: digital input 1				
	1.150	rot.direction	1: digital input 2				
🔲 field.parameter	1.180	reset	2: digital input 3				
🚔 motor parameter	1.181	automatic reset	3: digital input 4 4: analogue input 1				
Actual Values	1.182	quan.auto.reset	5: analogue input 2				
Accual values	2.050	pres.speed mode	6: fieldbus				
Error	2.051	preset speed 1	7: SAS/MODBUS				
	2.052	preset speed 2	8: digital input 1 right /	/ digital input 2 left			
	2.053	preset speed 3	10: customer PLC				
	2.054	preset speed 4	11: preset speed input				
	2.055	preset speed 5	12: internal potention	eter			
	2.056	preset speed 6	13: keypad				
	2.057	preset speed 7	15: virtual output 1				
	3.050	PID prop.gain	16: keypad storing				
	3.051	PID integr.gain	5 [1/s]	Always			

Figure 5-7: Software release signal: digital input 1

That the motor is allowed to start, besides the hardware release signal, a software release signal (1.131) is needed. The software release signal can be wired with the control terminal or set in the software. If a software release signal is desired to be triggered in the software, it can be set to digital input 1 in the simplest case. See chapter 7 for further information.

Parameter			
All Parameters	All Parame	ters	
basic parameter		1	
control mode	Number	Name	Value 1 Acceptance
	1.100	contror mode	1. I ID process controlle Always
process control	1.130	ref.channel	8: PID preset reference Always
control terminal	1.131	enable software	0: digital input 1 Always
dd function	1.132	start protect	0: disable Always
Jairuncuon	1.150	rot.direction	2: only left run 👻 🗸 🗙
parameter	1.180	reset	0: both directions
parameter	1.181	automatic reset	1: only right run
ual Values	1.182	quan.auto.reset	2: only left run
	2.050	pres.speed mode	3: digital input 1
rror	2.051	preset speed 1	5: digital input 3
	2.052	preset speed 2	6: digital input 4
	2.053	preset speed 3	7: customer PLC
	2.054	preset speed 4	8: analogue input 1
	2.055	preset speed 5	10: keypad key direction
	2.056	preset speed 6	11: keypad key 1 right / 2 left (always)
	2.057	preset speed 7	12: keypad key 1 right / 2 left (over stop)
	3.050	PID prop.gain	13: virtual output 1
	3.051	PID integr.gain	15: keypad key 1 right / 2 left (always) storing
	3.060	PID feedback	16: keypad key 1 right / 2 left (over stop) storing
	2.061	DTD invested	Ou disable Always

Figure 5-8: Rotation direction

With the parameter "rot.direction (1.150)" the desired motor rotation direction can be set.

5.1 Operation mode "preset speed"

Parameter All Parameters	eter All Parameters					
🔠 basic parameter						
I control mode	Number	Name	Value 1			
process control	1.020	low speed	25 Hz	Always		
	1.021	high speed	100 Hz	Always		
control terminal	1.050	deceleration 1	0,1 s	Always		
add.function	1.051	acceleration 1	0,1 s	Always		
field.parameter	1.100	control mode	1: PID process con 🔻			
-	1.130	ref.channel	0: frequency control n	node		
motor parameter	1.131	enable software	1: PID process contro	ller		
Actual Values	1.132	start protect	2: preset speed			
Error	1.150	rot.direction	3: customer PLC	Aiwayo		
	1.180	reset	4: digital input 4	Always		
	1 101		0			

Figure 5-9: Operation mode "preset speed"

If the motor should run with a fixed frequency, the parameter "Control mode (1.100)" has to be set to "preset speed".

Parameter				
All Parameters	All Paramet	ters		
🛄 basic parameter				
control mode	Number	Name	Value 1	Acceptance
process control	1.020	low speed	25 Hz	Always
	1.021	high speed	100 Hz	Always
E control terminal	1.050	deceleration 1	0,1 s	Always
add.function	1.051	acceleration 1	0,1 s	Always
🗐 field.parameter	1.100	control mode	1: PID process control	le Always
-	1.130	ref.channel	8: PID preset reference	e Always
 motor parameter 	1.131	enable software	0: digital input 1	Always
Actual Values	1.132	start protect	0: disable	Always
Error	1.150	rot.direction	2: only left run	Always
	1.180	reset	4: digital input 4	Always
	1.181	automatic reset	0 s	Always
	1.182	quan.auto.reset	5	Always
	2.050	pres.speed mode	2: preset speed 1-	
	2.051	preset speed 1	0: preset speed 1 (DI	
	2.052	preset speed 2	1: preset speed 1-3 (I	DI 1+ 2)
	2.053	preset speed 3	2: preset speed 1-7 (I	DI 1 - 3)
	2.054	preset speed 4	3: Folientastatur Tast	e 1 = Frequenz 1 / Taste 2 = Frequenz 2
	2.055	preset speed 5	4: Folientastatur Tast 40 Hz	e 1 = Frequenz 1 / Taste 2 = Frequenz 2 (speichernd) Always
	2.056	nreset speed 6	45 Hz	Always

Figure 5-10: Preset speed mode

If "preset speed 1" is chosen under "pres. speed mode (2.050)" the value of "preset speed 1 (2.051)" will be used. Enter the desired value here, e.g. 10 Hz.

Parameter		_		
All Parameters	All Parame	ters		
🖽 basic parameter		1	1	1
control mode	Number	Name	Value 1	
_	1.100	cond or mode	1. The process control	nivaya
process control	1.130	ref.channel	8: PID preset reference	Always
🖽 control terminal	1.131	enable software	0: digital input 1	Always
I add function	1.132	start protect	0: disable	Always
	1.150	rot.direction	2: only left run	Always
🖽 field.parameter	1.180	reset	4: digital input 4	Always
💼 motor parameter	1.181	automatic reset	0 s	Always
Actual Values	1.182	quan.auto.reset	5	Always
	2.050	pres.speed mode	2: preset speed 1-7 (D	Always
Error	2.051	preset speed 1	10 Hz	××
	2.052	preset speed 2	2.051 preset speed 1	
	2.053	preset speed 3	Min value = -400 Hz	
	2.054	preset speed 4	Max value = 400 Hz	
	2.055		40.11-	Abuseus

Figure 5-11: value of "preset speed 1"

For enabling the motor, see Chapter 7: Software release signal.

5.2 Internal potentiometer as set point value

If the motor should be controlled with the internal potentiometer, the following parameters have to be set.

Parameter					
All Parameters	All Paramet	iers			
🔠 basic parameter					
I control mode	Number	Name	Value 1	Accepta	
process control	1.020	low speed	25 Hz	Always	
	1.021	high speed	100 Hz	Always	
control terminal	1.050	deceleration 1	0,1 s	Always	
add.function	1.051	acceleration 1	0,1 s	Always	
field.parameter	1.100	control mode	1: PID process contro	lle Always	
-	1.130	ref.channel	8: PID preset refer		
- motor parameter	1.131	enable software	0: internal potention	eter	
Actual Values	1.132	start protect	1: analogue input 1		
Error	1.150	rot.direction	2: analogue input 2		
	1.180	reset	3: HMI/ PC		
	1.181	automatic reset	6: motor.pot.		
	1.182	quan.auto.reset	7: addition analogue	input 1 analogue input 2	
	2.050	pres.speed mode	8: PID preset referen	ce	
	2.051	preset speed 1	9: fieldbus		
	2.052	preset speed 2	20 Hz	Always	
	2 053	nreset sneed 3	30 Hz	Always	

Figure 5-12: Control mode "internal potentiometer"

The parameter "ref.channel (1.130)" needs to be set to "internal potentiometer".

Parameter All Parameters	All Paramet	ers		
basic parameter	Number	Name	Value 1	
process control	1.020	low speed	25 Hz	Always
control terminal	1.021	high speed	100 Hz	Always
add.function	1.050	acceleration 1	0,1 s	Always
field.parameter	1.100	control mode	1: PID process con 🔻	
motor parameter	1.130	ref.channel enable software	0: frequency control n	node Ier
Actual Values	1.132	start protect	2: preset speed	
Error	1.150	rot.direction	2. only left full	Aways
	1.180	reset	4: digital input 4	Always

Figure 5-13: Operation mode "frequency control mode"

Furthermore the parameter "control mode (1.100)" has to be set to "frequency control mode". After setting the software release signal the set point frequency can be changed with the internal potentiometer.

For enabling the motor, see Chapter 7: Software release signal.

kinesys@hydac.com

5.3 External analog signal as set point value

If the motor speed should be controlled with an external analog signal, the external source has to be wired with the control terminal.



Figure 5-14: control terminal for external analog speed control

"A In1" has to be connected with the positive pole and "A GND" with the ground pole of the external voltage source.

The following software parameters have to be set to control the rotation speed with an external voltage signal.

Parameter				
III Parameters	All Paramet	ers		
🖽 basic parameter				1
E control mode	Number	Name	Value 1	Acceptar
process control	1.020	low speed	25 Hz	Always
	1.021	high speed	100 Hz	Always
control terminal	1.050	deceleration 1	0,1 s	Always
🖽 add.function	1.051	acceleration 1	0,1 s	Always
field.parameter	1.100	control mode	1: PID process control	Always
mater parameter	1.130	ref.channel	8: PID preset refer 🔻	
Thotor parameter	1.131	enable software	0: internal potentiome	ter
Actual Values	1.132	start protect	1: analogue input 1	
Error	1.150	rot.direction	2: analogue input 2	
I	1.180	reset	3: HMI/ PC	
	1.181	automatic reset	6: motor.pot.	
	1.182	quan.auto.reset	7: addition analogue in	nput 1 analogue input 2
	2.050	pres.speed mode	8: PID preset reference	e
	2.051	preset speed 1	9: fieldbus	
	2.052	preset speed 2	20 Hz	Always
	2.053	preset speed 3	30 Hz	Always

Figure 5-15: Reference channel "analogue input 1"

The parameter "ref.channel (1.130)" has either to be set to "analogue input 1" or to "analogue input 2".

	Parameter		_		
	III Parameters	All Parame	ters		
	🔲 basic parameter				
	i control mode	Number	Name	Value 1	
	process control	1.020	low speed	25 Hz	Always
	······································	1.021	high speed	100 Hz	Always
	control terminal	1.050	deceleration 1	0,1 s	Always
	add.function	1.051	acceleration 1	0,1 s	Always
	field.parameter	1.100	control mode	1: PID process con 🔻	
	motor parameter	1.130	ref.channel	0: frequency control m	ode
	me motor parameter	1.131	enable software	1: PID process control	ler 📕
	Actual Values	1.132	start protect	2: preset speed	
	Error	1.150	rot.direction	3: customer PLC	Aiwaya
ľ		1.180	reset	4: digital input 4	Always

Figure 5-16: control mode: frequency control mode

The value "control mode (1.100)" has to be set to "frequency control mode". After setting the software release signal, the set point frequency can be dictated by the external signal.

For enabling the motor, see Chapter 7: Software release signal.

6 PID controller

6.1 Set point generator



Figure 6-1: control port for pressure regulator

The supply voltage of the pressure sensor needs to be connected with "24V Out", 0V with "GND" and the signal line (voltage signal) with "A In 1" or "A In 2", depending on the reference channel setting in Figure 4-15.

6.2 Set point control

To activate the PID process controller the following parameters have to be set.

Parameter All Parameters	All Paramet	ters		
🖽 basic parameter				
i control mode	Number	Name	Value 1	
III process control	1.020	low speed	25 Hz	Always
	1.021	high speed	100 Hz	Always
E control terminal	1.050	deceleration 1	0,1 s	Always
add.function	1.051	acceleration 1	0,1 s	Always
field.parameter	1.100	control mode	1: PID process con 🔻	
-	1.130	ref.channel	0: frequency control n	node
The motor parameter	1.131	enable software	1: PID process contro	ller
Actual Values	1.132	start protect	2: preset speed	
Error	1.150	rot.direction	3: customer PLC	Aiwaya
	1.180	reset	4: digital input 4	Always
	1.181	automatic reset	0.5	Always

Figure 6-2: PID process controller

The parameter "control mode (1.100)" has to be set to "PID process controller".

Parameter				
III Parameters	All Paramet	ters		
🛄 basic parameter		1		
control mode	Number	Name	Value 1	Acceptance
process control	1.020	low speed	25 Hz	Always
	1.021	high speed	100 Hz	Always
control terminal	1.050	deceleration 1	0,1 s	Always
add.function	1.051	acceleration 1	0,1 s	Always
field.parameter	1.100	control mode	1: PID process contro	lle Always
	1.130	ref.channel	8: PID preset refer	
motor parameter	1.131	enable software	0: internal potentiom	eter
Actual Values	1.132	start protect	1: analogue input 1	
Error	1.150	rot.direction	2: analogue input 2	
	1.180	reset	3: HMI/ PC	
	1.181	automatic reset	6: motor.pot.	
	1.182	quan.auto.reset	7: addition analogue	input 1 analogue input 2
	2.050	pres.speed mode	8: PID preset referen	ce
	2.051	preset speed 1	9: fieldbus	
	2.052	preset speed 2	20 Hz	Always
	2.053	preset speed 3	30 Hz	Always
	2.054	preset speed 4	35 Hz	Always

Figure 6-3: PID preset reference

For set point control the parameter "ref.channel (1.130)" has to be set to "PID preset reference".

Parameter All Parameters	All Parameters					
🔲 basic parameter						
control mode	Number	Name	Value 1			
III and a sector that	3.050	PID prop.gain	0,4	Always		
process control	3.051	PID integr.gain	5 [1/s]	Always		
🖽 control terminal	3.060	PID feedback	0: analogue input 1	Always		
add.function	3.061	PID inverted	0: disable	Always		
	3.062	PID preset ref.1	40 %	• <mark>< ></mark>		
	3.063	PID preset ref.2	3.062 PID preset ref.1			
🚔 motor parameter	3.064	PID preset ref.3	Min value = 0 %			
Actual Values	3.065	PID preset ref.4	Max value = 100 %			
Error	3.066	PID preset ref.5	0 %	Always		
	3.067	PID preset ref.6	0 %	Always		

Figure 6-4: PID preset reference

The desired set point value can be defined at the parameter "PID preset ref.1 (3.062)". This value represents the percentage of the maximal

pressure sensor output voltage.

Parameter				
III All Parameters	All Paramet	ers		
🔠 basic parameter				1
E control mode	Number	Name	Value 1	A
process control	3.065	PID preset ref.4	0 %	Always
	3.066	PID preset ref.5	0 %	Always
🖽 control terminal	3.067	PID preset ref.6	0 %	Always
add.function	3.068	PID preset ref.7	0 %	Always
field.parameter	3.069	PID pre.ref.mode	0: PID preset refer 🔻	
. mater narameter	3.073	PID ref.min	0: PID preset referenc	e 1
motor parameter	3.074	PID ref.max	1: PID preset reference	e 1-3 (DI 1 + 2)
Actual Values	4.020	AI1 ref.type	2: PID preset reference	e 1-7 (DI 1 - 3)
Error	4.021	AI1 min.input	0 %	Always
	4.022	AI1 max.input	100 %	Always

Figure 6-5: PID preset reference mode

That the motor can be controlled with preset reference 1, the parameter "PID pre.ref.mode (3.069)" has to be set to "PID preset reference 1".

6.3 Pressure control with analog set point setting

For the analog set point setting the analog signal has to be connected to "An1" or "An2" and the following settings have to be done.

Parameter				
III Parameters	All Paramet	ters		
🔲 basic parameter				1
control mode	Number	Name	Value 1	Accep
— —	3.050	PID prop.gain	0,4	Always
process control	3.051	PID integr.gain	5 [1/s]	Always
control terminal	3.060	PID feedback	0: analogue input : 🔻	
add.function	3.061	PID inverted	0: analogue input 1	
E field perspector	3.062	PID preset ref.1	1: analogue input 2	
ieid.parameter	3.063	PID preset ref.2	2: customer PLC	
motor parameter	3.064	PID preset ref.3	3: fieldbus (customer	PLC input variable 2)
Actual Values	3.065	PID preset ref.4	0 %	Always
Error	3.066	PID preset ref.5	0 %	Always
LIIVI	3.067	PID preset ref.6	0 %	Always
	2.059	DID procet ref 7	0.0/	Alwaya

Figure 6-6: PID feedback

The parameter "PID feedback (3.060)" has, depending on the connected port, to be set to "analogue input 1" or "analogue input 2".

6.4 PID controller settings

For each system the control parameters "proportional gain" and "integral gain" have to be adapted. The "derivational gain" is rarely required.

Parameter All Parameters	All Parame	ters		
basic parameter	Number	Name	Value 1	
control mode				
process control	2.056	preset speed 6	45 Hz	Always
	2.057	preset speed 7	50 Hz	Always
control terminal	3.050	PID prop.gain	0,4	
add.function	3.051	PID integr.gain	3.050 PID prop.gain	
field.parameter	3.060	PID feedback	Min value = 0	
	3.061	PID inverted	Max value = 100	
🚍 motor parameter	3.062	PID preset ref.1	40 %	Always
Actual Values	3.063	PID preset ref.2	0 %	Always

Figure 6-7: PID-P gain

Set the desired value for the proportional gain at "PID prop.gain (3.050)".

Parameter				
III All Parameters	All Paramet	ers		
🖽 basic parameter		1		1
🖽 control mode	Number	Name	Value 1	
process control	2.056	preset speed 6	45 Hz	Always
	2.057	preset speed 7	50 Hz	Always
E control terminal	3.050	PID prop.gain	0,4	Always
add.function	3.051	PID integr.gain	5 [1/s]	
🗐 field.parameter	3.060	PID feedback	3.051 PID integr.gain	
	3.061	PID inverted	Min value = $0 [1/s]$	
 motor parameter 	3.062	PID preset ref.1	Max value = 100 [1/s]	
Actual Values	3.063	PID preset ref.2	0 %	Always

Figure 6-8: PID-I gain

Set the desired value for the integral gain at "PID integr.gain (3.051)".

To find the correct parameters the following approach can be used:

Gradually increase the proportional gain until the system starts swinging. Thereafter slightly decrease the P-Gain and adjust the system dynamics with the I-Gain.

7 Software release signal

There are two possibilities to set the software release signal:

- In the software HMM Start-Up
- By external wiring

Setting the software release signal in the software HMM Start-Up

In the Control tab the digital input 1 can be set to TRUE, that "software release signal" is triggered and the motor can start running.

File Device Selection	on E	Extra Window	Help					
		الله ال	Muite.	<u>í</u>	Baramatar	E Astual Values - E		<u>3</u> .
Tasks	x	Connect	vvrite	кеао	Parameter	Actual values E	rror	Control
Cockpit								
Parameter		Control						
Actual Values		1 120 -	of channel		waret ve	M. est disital insut 1		on/off
Error		1.130 1	er.channer	[8: PID]	breset re	J. Set digital input 1	0	onyon
Control	2	re re	eference		0,0 Hz	set digital input 2	2 0	on/off
Oscilloscope				-J		set digital input 3	0	on/off
						📃 set digital input 4	0	on/off
		1.131 e	enable software	0: digita	al input 1			
		e e	nable					
			start	stop				
		🔽 set	analogue input 1	L	0,00 V	set digital output	1 ()	on/off
		📃 set	analogue input 2	2	0,00 V	set digital output	2 🔘	on/off
						set relay 1	0	on/off
		🔽 set	analogue output	1	0,00 V	set relay 2	Θ	on/off
		manual	control off					

Figure 7-1: Control tab

Once digital input 1 is set to TRUE (see Figure 7-2), the motor starts running.

File Device Selection	Extra Window Help							
Dpen Save	Connect Write	🖄 🛄 Read Paramete	er Actual Values	Error	<u>لا</u> Control	Oscilloscope	Refresh	0,5 s 🔽 AutoWrite
Tasks X								
Parameter	Control							
Actual Values				_				
Error	1.130 ref.channel	8: PID preset re	set digital inpu	it 1 😑	on/off			
Control	reference	0,0 Hz	set digital inpu	ıt 2 🔘	on/off			
Oscilloscope		-į	set digital inpu	it 3 🔘	on/off			
			📃 set digital inpu	ıt 4 🔘	on/off			
	1.131 enable software	0: digital input 1						
	enable							
	start	stop						
	🔲 set analogue input	1 0,00 V	set digital out	out 1 🖯	on/off			
	🔲 set analogue input	2 0,00 V	set digital outp	out 2 🔘	on/off			
			set relay 1	Θ	on/off			
	🔲 set analogue outpu	it 1 0,00 V	set relay 2	Θ	on/off			
	manual control off							

Figure 7-2: Active digital input 1

Setting the software release signal by external wiring

See Table 3-3 and chapter 5 for basic commissioning.

8 Saving up and restoring the parameterization

8.1 Save

If the parameterization should be backed up, click on the "File"-tab on the "Save as" entry and save the data in a desired location.

File	Device	Selection	Extra	Window	Help	
	Open	CT	RL+O	act	Write	
	Close			. CL	write	
	Save	CT	RL+S			
	Save As					
	Recent Fi	les	÷			
	Exit					
_				-		



8.2 Restore

If a parameterization should be loaded, click on the "Open" button and chose the desired File.



Figure 8-2: Restore

