Medium Voltage Frequency Inverter

MVW01

Programming Manual

Programming Manual

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Summary of reviews

Version	Review	Description
-	00	First edition Division of the manual into user manual and programming manual

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Software: V3.5X
Application:
Model:
Serial number:
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Date: / / .

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Param.	Description	Adjustable range	Factory setting	Page
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Param.	Description	Adjustable range	Factory setting	Page
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Param.	Description	Adjustable range	Factory setting	Page
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P0272	DI10 Function	0 = Not Used 1 = LOC/REM 2 = Gen Enable 3 = JOG 4 = No Ext Flt 5 = Not Used 6 = Ramp 2 7 = Not Used 8 = Stop 9 = Not Used 10 = JOG + 11 = JOG - 12 = Reset 13 = Fieldbus 14 = 3WireStop 15 = Man/Auto 16 = No Ext Alm 17 = Not Used 18 = Not Used 19 = No Motor F 20 = No Motor A 21 = No Vnt.A A 22 = No Vnt.A B 23 = StartSyncT 24 = Vent. OK	0	5-57

Param.	Description	Adjustable range	Factory setting	Page
P0275	DO1 Function	0 = Not Used 1 = N* > Nx 2 = N > Nx 3 = N < Ny 4 = N = N* 5 = Zero Speed 6 = Is > Ix 7 = Is < Ix 8 = Not Used 9 = Not Used 10 = Remote 11 = Run 12 = Ready 13 = No Fault 14 = No E70 15 = No 22/21/6 16 = No E62 17 = No E72 18 = 4-20mA(Ok) 19 = Fieldbus 20 = Forward 21 = Pr.V.> PVx 22 = Pr.V.< PVy 23 = Not Used 24 = PCharge OK 25 = Fault 26 = N>Nx/Nt>Nx 27 = NoFaultDly 28 = No Alarm 29 = Not Used 30 = Vent. Sel. 31 = Not Used 32 = Circ.Break 33 = Transf. OK 34 = Sync. OK 35 = Serial 36 = Safety Stop 37 = S.Filt.CB 38 = Alone/Sla	0	5-62

Param.	Description	Adjustable range	Factory setting	Page
P0276	DO2 Function	0 = Not Used 1 = N* > Nx 2 = N > Nx 3 = N < Ny 4 = N = N* 5 = Zero Speed 6 = Is > Ix 7 = Is < Ix 8 = Not Used 9 = Not Used 10 = Remote 11 = Run 12 = Ready 13 = No Fault 14 = No E70 15 = No 22/21/6 16 = No E62 17 = No E72 18 = 4-20mA(Ok) 19 = Fieldbus 20 = Forward 21 = Pr.V.> PVx 22 = Pr.V.< PVy 23 = Not Used 24 = PCharge OK 25 = Fault 26 = N>Nx/Nt>Nx 27 = NoFaultDly 28 = No Alarm 29 = Not Used 30 = Vent. Sel. 31 = Not Used 32 = Circ.Break 33 = Transf. OK 34 = Sync. OK 35 = Serial 36 = Safety Stop 37 = S.Filt.CB 38 = Alone/Sla	0	5-62

Param.	Description	Adjustable range	Factory setting	Page
P0277	RL1 Function	0 = Not Used 1 = N* > Nx 2 = N > Nx 3 = N < Ny 4 = N = N* 5 = Zero Speed 6 = Is > Ix 7 = Is < Ix 8 = Not Used 9 = Not Used 10 = Remote 11 = Run 12 = Ready 13 = No Fault 14 = No E70 15 = No 22/21/6 16 = No E62 17 = No E72 18 = 4-20mA(Ok) 19 = Fieldbus 20 = Forward 21 = Pr.V.> PVx 22 = Pr.V.< PVy 23 = Not Used 24 = PCharge OK 25 = Fault 26 = N>Nx/Nt>Nx 27 = NoFaultDly 28 = No Alarm 29 = Not Used 30 = Vent. Sel. 31 = PLC 32 = Circ.Break 33 = Transf. OK 34 = Sync. OK 35 = Serial 36 = Safety Stop 37 = S.Filt.CB 38 = Alone/Sla	13	5-62

Param.	Description	Adjustable range	Factory setting	Page
P0279	RL2 Function	0 = Not Used 1 = N* > Nx 2 = N > Nx 3 = N < Ny 4 = N = N* 5 = Zero Speed 6 = Is > Ix 7 = Is < Ix 8 = Not Used 9 = Not Used 10 = Remote 11 = Run 12 = Ready 13 = No Fault 14 = No E70 15 = No 22/21/6 16 = No E62 17 = No E72 18 = 4-20mA(Ok) 19 = Fieldbus 20 = Forward 21 = Pr.V.> PVx 22 = Pr.V.< PVy 23 = Not Used 24 = PCharge OK 25 = Fault 26 = N>Nx/Nt>Nx 27 = NoFaultDly 28 = No Alarm 29 = Timer 30 = Vent. Sel. 31 = PLC 32 = Circ.Break 33 = Transf. OK 34 = Sync. OK 35 = Serial 36 = Safety Stop 37 = S.Filt.CB 38 = Alone/Sla	2	5-62

Param.	Description	Adjustable range	Factory setting	Page
P0280	RL3 Function	0 = Not Used 1 = N* > Nx 2 = N > Nx 3 = N < Ny 4 = N = N* 5 = Zero Speed 6 = Is > Ix 7 = Is < Ix 8 = Not Used 9 = Not Used 10 = Remote 11 = Run 12 = Ready 13 = No Fault 14 = No E70 15 = No 22/21/6 16 = No E62 17 = No E72 18 = 4-20mA(Ok) 19 = Fieldbus 20 = Forward 21 = Pr.V.> PVx 22 = Pr.V.< PVy 23 = Not Used 24 = PCharge OK 25 = Fault 26 = N>Nx/Nt>Nx 27 = NoFaultDly 28 = No Alarm 29 = Timer 30 = Vent. Sel. 31 = PLC 32 = Circ.Break 33 = Transf. OK 34 = Sync. OK 35 = Serial 36 = Safety Stop 37 = S.Filt.CB 38 = Alone/Sla	1	5-62

Param.	Description	Adjustable range	Factory setting	Page
P0281	RL4 Function	0 = Not Used 1 = N* > Nx 2 = N > Nx 3 = N < Ny 4 = N = N* 5 = Zero Speed 6 = Is > Ix 7 = Is < Ix 8 = Not Used 9 = Not Used 10 = Remote 11 = Run 12 = Ready 13 = No Fault 14 = No E70 15 = No 22/21/6 16 = No E62 17 = No E72 18 = 4-20mA(Ok) 19 = Fieldbus 20 = Forward 21 = Pr.V.> PVx 22 = Pr.V.< PVy 23 = Not Used 24 = PCharge OK 25 = Fault 26 = N>Nx/Nt>Nx 27 = NoFaultDly 28 = No Alarm 29 = Not Used 30 = Vent. Sel. 31 = Not Used 32 = Circ.Break 33 = Transf. OK 34 = Sync. OK 35 = Serial 36 = Safety Stop 37 = S.Filt.CB 38 = Alone/Sla	0	5-62

Param.	Description	Adjustable range	Factory setting	Page
P0282	RL5 Function	0 = Not Used 1 = N* > Nx 2 = N > Nx 3 = N < Ny 4 = N = N* 5 = Zero Speed 6 = Is > Ix 7 = Is < Ix 8 = Not Used 9 = Not Used 10 = Remote 11 = Run 12 = Ready 13 = No Fault 14 = No E70 15 = No 22/21/6 16 = No E62 17 = No E72 18 = 4-20mA(Ok) 19 = Fieldbus 20 = Forward 21 = Pr.V.> PVx 22 = Pr.V.< PVy 23 = Not Used 24 = PCharge OK 25 = Fault 26 = N>Nx/Nt>Nx 27 = NoFaultDly 28 = No Alarm 29 = Not Used 30 = Vent. Sel. 31 = Not Used 32 = Circ.Break 33 = Transf. OK 34 = Sync. OK 35 = Serial 36 = Safety Stop 37 = S.Filt.CB 38 = Alone/Sla	0	5-62
P0283	RL2 ON Time	0.0 to 300.0 s	0.0 s	5-66
P0284	RL2 OFF Time	0.0 to 300.0 s	0.0 s	5-66
P0285	RL3 ON Time	0.0 to 300.0 s	0.0 s	5-66
P0286	RL3 OFF Time	0.0 to 300.0 s	0.0 s	5-66
P0288	Nx Speed	0 to 4095 rpm	120 rpm	5-66
P0289	Ny Speed	0 to 4095 rpm	1800 rpm	5-66
P0290	Ix Current	0.0 to 3276.7 A	300.0 A	5-66
P0291	Zero Speed Zone	1 to 100 %	1 %	5-66
P0292	N=N* Band	1 to 100 %	1 %	5-67
P0294	Overload Class	0 = ND 15% VT 1 = HD 50% CT 2 = MX 0% NO	0	5-67
P0295	Inverter rated current	0 to 219	106	5-67
P0296	Inverter rated voltage	0 = 220/230 V 1 = 380 V 2 = 2.3 kV 3 = 3.3 kV 4 = 4.16 kV 5 = 6.9 kV 6 = 4.6 kV	4	5-68
P0303	Skipped Speed 1	0 to 4095 rpm	600 rpm	5-69

Param.	Description	Adjustable range	Factory setting	Page
P0304	Skipped Speed 2	0 to 4095 rpm	900 rpm	5-69
P0305	Skipped Speed 3	0 to 4095 rpm	1200 rpm	5-69
P0306	Skipped Range	0 to 750 rpm	0 rpm	5-69
P0308	Serial address	1 to 30	1	5-69
P0309	Fieldbus	0 = Off 1 = Ethernet/IP 2 I/O 2 = Profibus DP 4 I/O 3 = Profibus DP 6 I/O 4 = DeviceNet 2 I/O 5 = DeviceNet 4 I/O 6 = DeviceNet 6 I/O 7 = Modbus-RTU 2 I/O 8 = Modbus-RTU 4 I/O 9 = Modbus-RTU 6 I/O 10 = DeviceNet Drive Profile 11 = Ethernet 2 I/O 12 = Ethernet 4 I/O 13 = Ethernet 6 I/O	0	5-70
P0312	Type of serial protocol	0 = WEG Protocol, 9600 bps 1 = Modbus-RTU, 9600 bps, no parity 2 = Modbus-RTU, 9600 bps, odd parity 3 = Modbus-RTU, 9600 bps, even parity 4 = Modbus-RTU, 19200 bps, no parity 5 = Modbus-RTU, 19200 bps, odd parity 6 = Modbus-RTU, 19200 bps, even parity 7 = Modbus-RTU, 38400 bps, no parity 8 = Modbus-RTU, 38400 bps, odd parity 9 = Modbus-RTU, 38400 bps, even parity 10 = WEG Protocol, 19200 bps 11 = WEG Protocol, 38400 bps	7	5-70
P0313	Action for communication error	0 = Ramp stop 1 = General disable 2 = No action 3 = Change to LOC 4 = Reserved 5 = Fault	0	5-71
P0314	Time for serial watchdog action	0.0 to 999.0 s	0.0 s	5-71
P0315	Function of the MVC3 SCI1 serial channel	0 = HMI 1 = TecSystem 2 = Pextron	0	5-71
P0320	Flying Start/ Ride-Through	0 = Off 1 = Fly Start 2 = FS / RT 3 = Ride-Thru	0	5-72
P0321	Ud Power Loss	356 to 8000 V	4850 V	5-72
P0322	Ud Ride-Through	356 to 8000 V	4700 V	5-72
P0323	Ud Power Back	356 to 8000 V	5300 V	5-72
P0325	Ride-Thru P Gain	0.0 to 63.9	1.0	5-74
P0326	Ride-Thru I Con.	0 to 9999	201	5-74
P0327	Sensorless flying start delay	0.000 to 9.999 s	0.100 s	5-74
P0328	Sensorless flying start frequency	0 = P134 1 = P001	1	5-75
P0329	Sensorless flying start direction	0 = + P328 - 1 = - P328 + 2 = + P328 3 = - P328	0	5-75

Param.	Description	Adjustable range	Factory setting	Page
P0331	Voltage ramp time setting	0.2 to 50.0 s	8.0 s	5-75
P0332	Dead Time	0.1 to 40.0 s	10.0 s	5-75
P0333	Ride-Through Time	0.0 to 20.0 s	10.0 s	5-75
P0400	Motor rated voltage	1 to 9999 V	4160 V	5-76
P0401	Motor rated current	0.1 to 6553.5 A	300.0 A	5-77
P0402	Motor rated speed	1 to 7200 rpm	1796 rpm	5-77
P0403	Motor Rated Freq	1 to 120 Hz	60 Hz	5-77
P0405	Speed sensor data (encoder)	100 to 9999 PPR	1024 PPR	5-78
P0406	Ventilation Type	0 = Self-ventilated 1 = Separated ventilation	0	5-78
P0407	Nominal PF	0.50 to 1.00	0.68	5-78
P0408	Run Self-tuning	0 = No 1 = Self Gain	1	5-78
P0409	Motor stator resistance Rs	0.000 to 9.999 Ω	0.000 Ω	5-79
P0410	Motor magnetization current (Imr)	0.0 to 1024.0 A	0.0 A	5-79
P0411	Motor Flux Leakage Inductance	0.00 to 99.99 mH	0.00 mH	5-79
P0412	Lr/Rr Constant	0.000 to 9.999 s	0.000 s	5-79
P0413	Tm Time Constant	0.00 to 99.99 s	0.00 s	5-80
P0414	Magnetizing voltage	0.0 to 20.0 %	0.0 %	5-80
P0427	Inductance LD sigma	0.00 to 99.99 mH	4.85 mH	5-80
P0428	Inductance LQ sigma	0.00 to 99.99 mH	4.41 mH	5-81
P0429	Resistence RD	0.000 to 9.999 Ω	1.139 Ω	5-81
P0430	Resistance RQ	0.000 to 9.999 Ω	0.831 Ω	5-82
P0431	Number of motor poles	2 to 64	4	5-82
P0433	Inductance Lq	0.0 to 999.9 mH	45.7 mH	5-82
P0434	Inductance Ld	0.0 to 999.9 mH	86.9 mH	5-82
P0436	Inductance Lf	0.0 to 999.9 mH	88.0 mH	5-83
P0437	Resistence Rf	0.000 to 9.999 Ω	0.047 Ω	5-83
P0438	Proportional gain of current reg. IQ	0.000 to 9.999	0.034	5-83
P0439	Integration constant of current reg. IQ	0.1 to 999.9	9.0	5-84
P0440	Proportional gain of current reg. ID	0.000 to 9.999	0.074	5-84
P0441	Integration constant of current reg. ID	0.1 to 999.9	19.6	5-84
P0442	Prop. Gain If	0.000 to 9.999	0.788	5-85
P0443	Field I Const	1 to 9999	703	5-85
P0444	Maximum Uf	0.01 to 1.00 PU	0.58 PU	5-85
P0445	Minimum Uf	0.01 to 1.00 PU	0.01 PU	5-85
P0446	Base field current	0.1 to 999.9 A	33.3 A	5-86
P0447	Proportional gain of the field regulator	0.000 to 9.999	0.087	5-86

Param.	Description	Adjustable range	Factory setting	Page
P0448	Integration constant of the field regulator	1 to 9999	70	5-86
P0449	Maximum field current (Brushless)	0.00 to 5.00 PU	0.70 PU	5-86
P0450	Minimum field current (Brushless)	0.00 to 5.00 PU	0.01 PU	5-87
P0451	Minimum field for soft-start function	0.01 to 5.00 PU	0.15 PU	5-87
P0452	Field input frequency	0.0 to 60.0 Hz	0.0 Hz	5-87
P0453	Field ramp time	0.00 to 30.00 s	1.00 s	5-88
P0454	Poly A1 magnetic saturation curve	-9.999 to 9.999	0.000	5-88
P0455	Poly B1 magnetic saturation curve	0.000 to 9.999	0.174	5-88
P0456	Poly C1 magnetic saturation curve	0.000 to 9.999	1.059	5-88
P0457	Poly a2 Exc	0.000 to 9.999	0.185	5-89
P0458	Poly b2 Exc	0.000 to 9.999	0.068	5-89
P0459	Poly c2 Exc	0.0 to 999.9	118.7	5-89
P0460	R Field n Stator	0.000 to 9.999 Ω	1.150 Ω	5-89
P0461	I Field Brushl.	0.1 to 999.9 A	25.6 A	5-90
P0462	Field current scale	0.1 to 999.9 A	94.0 A	5-90
P0463	Exciter rated voltage scale	0 to 9999 V	380 V	5-90
P0464	Maximum compensation current of PF	0.00 to 1.00 PU	0.80 PU	5-90
P0465	Excit. Delay	0.000 to 9.999 s	0.000 s	5-91
P0468	PM Gain	0.000 to 9.999	0.000	5-92
P0491	Graphic HMI Cfg.	0 = Inactive 1 = Local HMI 2 = Remote HMI	0	5-93
P0498	Force trigger	0 = Off 1 = On	0	5-93
P0499	Trace time	Read-only parameter (0.1 s)	-	5-93
P0520	PID proportional gain	0.000 to 7.999	1.000	5-94
P0521	PID integral gain	0.000 to 9.999	1.000	5-94
P0522	PID differential gain	0.000 to 9.999	0.000	5-94
P0523	PID Ramp Time	0.0 to 999.0 s	3.0 s	5-94
P0524	PID feedback selection	0 = AI2 (P237) 1 = AI3 (P241)	0	5-95
P0525	PID regulator setpoint	0.0 to 100.0 %	0.0 %	5-95
P0526	Process variable filter	0.0 to 16.0 s	0.1 s	5-95
P0527	Error Value Inv	0 = No 1 = Yes	0	5-96
P0528	Process variable scale factor	0 to 9999	1000	5-96
P0529	Process Variable Decimal Point	0 to 3	1	5-96
P0533	Process variable X value	0.0 to 100.0 %	90.0 %	5-97
P0534	Process variable Y value	0.0 to 100.0 %	10.0 %	5-97

Param.	Description	Adjustable range	Factory setting	Page
P0535	Output N = 0 PID	0 to 100 %	0 %	5-97
P0536	P0525 Automatic Setting	0 = Off 1 = On	0	5-98
P0550	Trigger parameter	0 = Inativo 1 = Motor speed reference 2 = Motor Speed 3 = Motor Current 4 = DC Link Voltage 5 = Motor Frequency 6 = VFD Status 7 = Motor Voltage 8 = Motor Torque 9 = Inverter output power 10 = Inverter Current 11 = Digital inputs DI1 to DI10 status 12 = Digital outputs DO1 to RL5 status 13 = Iv current 14 = Iw current 15 = Iu current 16 = Input AI5 17 = Value of process variable (PID) 18 = Active redundant ventilation set 19 = Junction temperature 20 = Phase UAp temperature 21 = Phase VAp temperature 22 = Phase WAp temperature 23 = BRAp Phase temperature 24 = Rectifier 1p temperature 25 = DC Link N Volt. 26 = DC Link P Volt. 27 = Phase U temperature 28 = Phase V temperature 29 = Phase W temperature 30 = BR Phase temperature 31 = Rectifier temperature 32 = Status of DIs MVC3 DI1, DI2, ..., DI16 33 = Status of the MVC3 DOs RL1 to RL8 34 = Vab Voltage 35 = Vcb Voltage 36 = Voltage in the transformer secondary 37 = MP-GND Voltage 38 = i x t Overload 39 = Motor field current 40 = Excit. Voltage 41 = Phase UB temperature 42 = Phase VB temperature 43 = Phase WB temperature 44 = Phase UBp temperature 45 = Phase VBp temperature 46 = Phase WBp temperature 47 = Rectifier 2 temperature 48 = Rectifier 3 temperature 49 = V DC Link N 50 = V DC Link P 51 = W DC Link N 52 = W DC Link P	0	5-98
P0551	Trigger value	-32768 to 32767	0	5-100

Param.	Description	Adjustable range	Factory setting	Page
P0552	Trigger condition	0 = Value = 1 = Value <> 2 = Value > 3 = Value < 4 = Fault 5 = Bit 0 6 = Bit 1 7 = Bit 2 8 = Bit 3 9 = Bit 4 10 = Bit 5 11 = Bit 6 12 = Bit 7 13 = Bit 8 14 = Bit 9 15 = Bit 10 16 = Bit 11 17 = Bit 12 18 = Bit 13 19 = Bit 14 20 = Bit 15 21 = Force trigger	4	5-100
P0553	Sampling time	1 to 9999 x 500 µs	4 x 500 µs	5-100
P0554	Pre-trigger	0 to 100 %	50 %	5-101

Param.	Description	Adjustable range	Factory setting	Page
P0555	CH1: Parameter	0 = Inativo 1 = Motor speed reference 2 = Motor Speed 3 = Motor Current 4 = DC Link Voltage 5 = Motor Frequency 6 = VFD Status 7 = Motor Voltage 8 = Motor Torque 9 = Inverter output power 10 = Inverter Current 11 = Digital inputs DI1 to DI10 status 12 = Digital outputs DO1 to RL5 status 13 = Iv current 14 = Iw current 15 = Iu current 16 = Input AI5 17 = Value of process variable (PID) 18 = Active redundant ventilation set 19 = Junction temperature 20 = Phase UAp temperature 21 = Phase VAp temperature 22 = Phase WAp temperature 23 = BRAp Phase temperature 24 = Rectifier 1p temperature 25 = DC Link N Volt. 26 = DC Link P Volt. 27 = Phase U temperature 28 = Phase V temperature 29 = Phase W temperature 30 = BR Phase temperature 31 = Rectifier temperature 32 = Status of DIs MVC3 DI1, DI2, ..., DI16 33 = Status of the MVC3 DOs RL1 to RL8 34 = Vab Voltage 35 = Vcb Voltage 36 = Voltage in the transformer secondary 37 = MP-GND Voltage 38 = i x t Overload 39 = Motor field current 40 = Excit. Voltage 41 = Phase UB temperature 42 = Phase VB temperature 43 = Phase WB temperature 44 = Phase UBp temperature 45 = Phase VBp temperature 46 = Phase WBp temperature 47 = Rectifier 2 temperature 48 = Rectifier 3 temperature 49 = V DC Link N 50 = V DC Link P 51 = W DC Link N 52 = W DC Link P	2	5-101
P0556	CH1: Mask	0 = None 1 = Bit 0 2 = Bit 1 3 = Bit 2 4 = Bit 3 5 = Bit 4 6 = Bit 5 7 = Bit 6 8 = Bit 7 9 = Bit 8 10 = Bit 9 11 = Bit 10 12 = Bit 11 13 = Bit 12 14 = Bit 13 15 = Bit 14 16 = Bit 15	0	5-103

Param.	Description	Adjustable range	Factory setting	Page
P0557	CH2: Parameter	0 = Inativo 1 = Motor speed reference 2 = Motor Speed 3 = Motor Current 4 = DC Link Voltage 5 = Motor Frequency 6 = VFD Status 7 = Motor Voltage 8 = Motor Torque 9 = Inverter output power 10 = Inverter Current 11 = Digital inputs DI1 to DI10 status 12 = Digital outputs DO1 to RL5 status 13 = Iv current 14 = Iw current 15 = Iu current 16 = Input AI5 17 = Value of process variable (PID) 18 = Active redundant ventilation set 19 = Junction temperature 20 = Phase UAp temperature 21 = Phase VAp temperature 22 = Phase WAp temperature 23 = BRAp Phase temperature 24 = Rectifier 1p temperature 25 = DC Link N Volt. 26 = DC Link P Volt. 27 = Phase U temperature 28 = Phase V temperature 29 = Phase W temperature 30 = BR Phase temperature 31 = Rectifier temperature 32 = Status of DIs MVC3 DI1, DI2, ..., DI16 33 = Status of the MVC3 DOs RL1 to RL8 34 = Vab Voltage 35 = Vcb Voltage 36 = Voltage in the transformer secondary 37 = MP-GND Voltage 38 = i x t Overload 39 = Motor field current 40 = Excit. Voltage 41 = Phase UB temperature 42 = Phase VB temperature 43 = Phase WB temperature 44 = Phase UBp temperature 45 = Phase VBp temperature 46 = Phase WBp temperature 47 = Rectifier 2 temperature 48 = Rectifier 3 temperature 49 = V DC Link N 50 = V DC Link P 51 = W DC Link N 52 = W DC Link P	3	5-103
P0558	CH2: Mask	0 = None 1 = Bit 0 2 = Bit 1 3 = Bit 2 4 = Bit 3 5 = Bit 4 6 = Bit 5 7 = Bit 6 8 = Bit 7 9 = Bit 8 10 = Bit 9 11 = Bit 10 12 = Bit 11 13 = Bit 12 14 = Bit 13 15 = Bit 14 16 = Bit 15	0	5-105

Param.	Description	Adjustable range	Factory setting	Page
P0559	CH3: Parameter	0 = Inativo 1 = Motor speed reference 2 = Motor Speed 3 = Motor Current 4 = DC Link Voltage 5 = Motor Frequency 6 = VFD Status 7 = Motor Voltage 8 = Motor Torque 9 = Inverter output power 10 = Inverter Current 11 = Digital inputs DI1 to DI10 status 12 = Digital outputs DO1 to RL5 status 13 = Iv current 14 = Iw current 15 = Iu current 16 = Input AI5 17 = Value of process variable (PID) 18 = Active redundant ventilation set 19 = Junction temperature 20 = Phase UAp temperature 21 = Phase VAp temperature 22 = Phase WAp temperature 23 = BRAp Phase temperature 24 = Rectifier 1p temperature 25 = DC Link N Volt. 26 = DC Link P Volt. 27 = Phase U temperature 28 = Phase V temperature 29 = Phase W temperature 30 = BR Phase temperature 31 = Rectifier temperature 32 = Status of DIs MVC3 DI1, DI2, ..., DI16 33 = Status of the MVC3 DOs RL1 to RL8 34 = Vab Voltage 35 = Vcb Voltage 36 = Voltage in the transformer secondary 37 = MP-GND Voltage 38 = i x t Overload 39 = Motor field current 40 = Excit. Voltage 41 = Phase UB temperature 42 = Phase VB temperature 43 = Phase WB temperature 44 = Phase UBp temperature 45 = Phase VBp temperature 46 = Phase WBp temperature 47 = Rectifier 2 temperature 48 = Rectifier 3 temperature 49 = V DC Link N 50 = V DC Link P 51 = W DC Link N 52 = W DC Link P	4	5-105
P0560	CH3: Mask	0 = None 1 = Bit 0 2 = Bit 1 3 = Bit 2 4 = Bit 3 5 = Bit 4 6 = Bit 5 7 = Bit 6 8 = Bit 7 9 = Bit 8 10 = Bit 9 11 = Bit 10 12 = Bit 11 13 = Bit 12 14 = Bit 13 15 = Bit 14 16 = Bit 15	0	5-107

Param.	Description	Adjustable range	Factory setting	Page
P0561	CH4: Parameter	0 = Inativo 1 = Motor speed reference 2 = Motor Speed 3 = Motor Current 4 = DC Link Voltage 5 = Motor Frequency 6 = VFD Status 7 = Motor Voltage 8 = Motor Torque 9 = Inverter output power 10 = Inverter Current 11 = Digital inputs DI1 to DI10 status 12 = Digital outputs DO1 to RL5 status 13 = Iv current 14 = Iw current 15 = Iu current 16 = Input AI5 17 = Value of process variable (PID) 18 = Active redundant ventilation set 19 = Junction temperature 20 = Phase UAp temperature 21 = Phase VAp temperature 22 = Phase WAp temperature 23 = BRAp Phase temperature 24 = Rectifier 1p temperature 25 = DC Link N Volt. 26 = DC Link P Volt. 27 = Phase U temperature 28 = Phase V temperature 29 = Phase W temperature 30 = BR Phase temperature 31 = Rectifier temperature 32 = Status of DIs MVC3 DI1, DI2, ..., DI16 33 = Status of the MVC3 DOs RL1 to RL8 34 = Vab Voltage 35 = Vcb Voltage 36 = Voltage in the transformer secondary 37 = MP-GND Voltage 38 = i x t Overload 39 = Motor field current 40 = Excit. Voltage 41 = Phase UB temperature 42 = Phase VB temperature 43 = Phase WB temperature 44 = Phase UBp temperature 45 = Phase VBp temperature 46 = Phase WBp temperature 47 = Rectifier 2 temperature 48 = Rectifier 3 temperature 49 = V DC Link N 50 = V DC Link P 51 = W DC Link N 52 = W DC Link P	5	5-107
P0562	CH4: Mask	0 = None 1 = Bit 0 2 = Bit 1 3 = Bit 2 4 = Bit 3 5 = Bit 4 6 = Bit 5 7 = Bit 6 8 = Bit 7 9 = Bit 8 10 = Bit 9 11 = Bit 10 12 = Bit 11 13 = Bit 12 14 = Bit 13 15 = Bit 14 16 = Bit 15	0	5-109

Param.	Description	Adjustable range	Factory setting	Page
P0563	CH5: Parameter	0 = Inativo 1 = Motor speed reference 2 = Motor Speed 3 = Motor Current 4 = DC Link Voltage 5 = Motor Frequency 6 = VFD Status 7 = Motor Voltage 8 = Motor Torque 9 = Inverter output power 10 = Inverter Current 11 = Digital inputs DI1 to DI10 status 12 = Digital outputs DO1 to RL5 status 13 = Iv current 14 = Iw current 15 = Iu current 16 = Input AI5 17 = Value of process variable (PID) 18 = Active redundant ventilation set 19 = Junction temperature 20 = Phase UAp temperature 21 = Phase VAp temperature 22 = Phase WAp temperature 23 = BRAp Phase temperature 24 = Rectifier 1p temperature 25 = DC Link N Volt. 26 = DC Link P Volt. 27 = Phase U temperature 28 = Phase V temperature 29 = Phase W temperature 30 = BR Phase temperature 31 = Rectifier temperature 32 = Status of DIs MVC3 DI1, DI2, ..., DI16 33 = Status of the MVC3 DOs RL1 to RL8 34 = Vab Voltage 35 = Vcb Voltage 36 = Voltage in the transformer secondary 37 = MP-GND Voltage 38 = i x t Overload 39 = Motor field current 40 = Excit. Voltage 41 = Phase UB temperature 42 = Phase VB temperature 43 = Phase WB temperature 44 = Phase UBp temperature 45 = Phase VBp temperature 46 = Phase WBp temperature 47 = Rectifier 2 temperature 48 = Rectifier 3 temperature 49 = V DC Link N 50 = V DC Link P 51 = W DC Link N 52 = W DC Link P	6	5-109
P0564	CH5: Mask	0 = None 1 = Bit 0 2 = Bit 1 3 = Bit 2 4 = Bit 3 5 = Bit 4 6 = Bit 5 7 = Bit 6 8 = Bit 7 9 = Bit 8 10 = Bit 9 11 = Bit 10 12 = Bit 11 13 = Bit 12 14 = Bit 13 15 = Bit 14 16 = Bit 15	0	5-111

Param.	Description	Adjustable range	Factory setting	Page
P0565	CH6: Parameter	0 = Inativo 1 = Motor speed reference 2 = Motor Speed 3 = Motor Current 4 = DC Link Voltage 5 = Motor Frequency 6 = VFD Status 7 = Motor Voltage 8 = Motor Torque 9 = Inverter output power 10 = Inverter Current 11 = Digital inputs DI1 to DI10 status 12 = Digital outputs DO1 to RL5 status 13 = Iv current 14 = Iw current 15 = Iu current 16 = Input AI5 17 = Value of process variable (PID) 18 = Active redundant ventilation set 19 = Junction temperature 20 = Phase UAp temperature 21 = Phase VAp temperature 22 = Phase WAp temperature 23 = BRAp Phase temperature 24 = Rectifier 1p temperature 25 = DC Link N Volt. 26 = DC Link P Volt. 27 = Phase U temperature 28 = Phase V temperature 29 = Phase W temperature 30 = BR Phase temperature 31 = Rectifier temperature 32 = Status of DIs MVC3 DI1, DI2, ..., DI16 33 = Status of the MVC3 DOs RL1 to RL8 34 = Vab Voltage 35 = Vcb Voltage 36 = Voltage in the transformer secondary 37 = MP-GND Voltage 38 = i x t Overload 39 = Motor field current 40 = Excit. Voltage 41 = Phase UB temperature 42 = Phase VB temperature 43 = Phase WB temperature 44 = Phase UBp temperature 45 = Phase VBp temperature 46 = Phase WBp temperature 47 = Rectifier 2 temperature 48 = Rectifier 3 temperature 49 = V DC Link N 50 = V DC Link P 51 = W DC Link N 52 = W DC Link P	7	5-111
P0566	CH6: Mask	0 = None 1 = Bit 0 2 = Bit 1 3 = Bit 2 4 = Bit 3 5 = Bit 4 6 = Bit 5 7 = Bit 6 8 = Bit 7 9 = Bit 8 10 = Bit 9 11 = Bit 10 12 = Bit 11 13 = Bit 12 14 = Bit 13 15 = Bit 14 16 = Bit 15	0	5-113

Param.	Description	Adjustable range	Factory setting	Page
P0567	CH7: Parameter	0 = Inativo 1 = Motor speed reference 2 = Motor Speed 3 = Motor Current 4 = DC Link Voltage 5 = Motor Frequency 6 = VFD Status 7 = Motor Voltage 8 = Motor Torque 9 = Inverter output power 10 = Inverter Current 11 = Digital inputs DI1 to DI10 status 12 = Digital outputs DO1 to RL5 status 13 = Iv current 14 = Iw current 15 = Iu current 16 = Input AI5 17 = Value of process variable (PID) 18 = Active redundant ventilation set 19 = Junction temperature 20 = Phase UAp temperature 21 = Phase VAp temperature 22 = Phase WAp temperature 23 = BRAp Phase temperature 24 = Rectifier 1p temperature 25 = DC Link N Volt. 26 = DC Link P Volt. 27 = Phase U temperature 28 = Phase V temperature 29 = Phase W temperature 30 = BR Phase temperature 31 = Rectifier temperature 32 = Status of DIs MVC3 DI1, DI2, ..., DI16 33 = Status of the MVC3 DOs RL1 to RL8 34 = Vab Voltage 35 = Vcb Voltage 36 = Voltage in the transformer secondary 37 = MP-GND Voltage 38 = i x t Overload 39 = Motor field current 40 = Excit. Voltage 41 = Phase UB temperature 42 = Phase VB temperature 43 = Phase WB temperature 44 = Phase UBp temperature 45 = Phase VBp temperature 46 = Phase WBp temperature 47 = Rectifier 2 temperature 48 = Rectifier 3 temperature 49 = V DC Link N 50 = V DC Link P 51 = W DC Link N 52 = W DC Link P	8	5-113
P0568	CH7: Mask	0 = None 1 = Bit 0 2 = Bit 1 3 = Bit 2 4 = Bit 3 5 = Bit 4 6 = Bit 5 7 = Bit 6 8 = Bit 7 9 = Bit 8 10 = Bit 9 11 = Bit 10 12 = Bit 11 13 = Bit 12 14 = Bit 13 15 = Bit 14 16 = Bit 15	0	5-115

Param.	Description	Adjustable range	Factory setting	Page
P0569	CH8: Parameter	0 = Inativo 1 = Motor speed reference 2 = Motor Speed 3 = Motor Current 4 = DC Link Voltage 5 = Motor Frequency 6 = VFD Status 7 = Motor Voltage 8 = Motor Torque 9 = Inverter output power 10 = Inverter Current 11 = Digital inputs DI1 to DI10 status 12 = Digital outputs DO1 to RL5 status 13 = Iv current 14 = Iw current 15 = Iu current 16 = Input AI5 17 = Value of process variable (PID) 18 = Active redundant ventilation set 19 = Junction temperature 20 = Phase UAp temperature 21 = Phase VAp temperature 22 = Phase WAp temperature 23 = BRAp Phase temperature 24 = Rectifier 1p temperature 25 = DC Link N Volt. 26 = DC Link P Volt. 27 = Phase U temperature 28 = Phase V temperature 29 = Phase W temperature 30 = BR Phase temperature 31 = Rectifier temperature 32 = Status of DIs MVC3 DI1, DI2, ..., DI16 33 = Status of the MVC3 DOs RL1 to RL8 34 = Vab Voltage 35 = Vcb Voltage 36 = Voltage in the transformer secondary 37 = MP-GND Voltage 38 = i x t Overload 39 = Motor field current 40 = Excit. Voltage 41 = Phase UB temperature 42 = Phase VB temperature 43 = Phase WB temperature 44 = Phase UBp temperature 45 = Phase VBp temperature 46 = Phase WBp temperature 47 = Rectifier 2 temperature 48 = Rectifier 3 temperature 49 = V DC Link N 50 = V DC Link P 51 = W DC Link N 52 = W DC Link P	9	5-115
P0570	CH8: Mask	0 = None 1 = Bit 0 2 = Bit 1 3 = Bit 2 4 = Bit 3 5 = Bit 4 6 = Bit 5 7 = Bit 6 8 = Bit 7 9 = Bit 8 10 = Bit 9 11 = Bit 10 12 = Bit 11 13 = Bit 12 14 = Bit 13 15 = Bit 14 16 = Bit 15	0	5-117
P0571	Start trace	0 = Off 1 = On	0	5-117

Param.	Description	Adjustable range	Factory setting	Page
P0572	Trace memory	1 to 100 %	50 %	5-117
P0621	Sin. Out. Filter	0 = Inactive 1 = Active 2 = With Oversample	0	5-118
P0622	End frequency of boost I x R	0 to 9999	4095	5-118
P0629	Synchronism time	1.0 to 20.0 s	3.0 s	5-118
P0630	Synchronism timeout	20 to 240 s	60 s	5-118
P0631	DI13 delay	0 to 3000 x 500 µs	170 x 500 µs	5-119
P0632	Maximum phase error	0 to 9999	1966	5-119
P0636	Phase adjustment	-32768 to 32767	0	5-119
P0652	MVC3 AO1 Funct.	0 to 255	2	5-119
P0653	MVC3 AO1 Gain	0.000 to 9.999	1.000	5-120
P0654	MVC3 AO2 Funct.	0 to 255	5	5-120
P0655	MVC3 AO2 Gain	0.000 to 9.999	1.000	5-120
P0656	MVC3 AO3 Funct.	0 to 255	2	5-121
P0657	MVC3 AO3 Gain	0.000 to 9.999	1.000	5-121
P0658	MVC3 AO4 Funct.	0 to 255	5	5-121
P0659	MVC3 AO4 Gain	0.000 to 9.999	1.000	5-121
P0663	OFFSET AO1 MVC3	-32768 to 32767	-90	5-121
P0664	OFFSET AO2 MVC3	-32768 to 32767	-90	5-121
P0665	OFFSET AO3 MVC3	-32768 to 32767	-90	5-121
P0666	OFFSET AO4 MVC3	-32768 to 32767	-90	5-121
P0667	MVC3 AO1 value	Read-only parameter (0.01 %)	-	5-121
P0668	MVC3 AO2 value	Read-only parameter (0.01 %)	-	5-121
P0669	MVC3 AO3 value	Read-only parameter (0.01 %)	-	5-121
P0674	MVC3 AO4 value	Read-only parameter (0.01 %)	-	5-121
P0721	Analog input AI5 function	0 = P221/P222	0	5-122
P0722	Input AI5 Gain	0.000 to 9.999	1.000	5-122
P0723	Analog input AI5 signal type	0 = 0-10V/20mA 1 = 4 - 20 mA 2 = 10V/20mA-0 3 = 20 - 4 mA	0	5-122
P0724	Input AI5 offset	-100.0 to 100.0 %	0.0 %	5-123
P0725	Minimum coasting time	0 to 300 s	0 s	5-123
P0727	Parallelism of inverters	0 = Without parallelism 1 = 2 inverters in parallel 2 = 3 inverters in parallel 3 = 4 inverters in parallel 4 = No paral. and 2 temp.s in the rectifier	0	5-123
P0740	AI1 MVC3 Funct.	0 = Not Used 1 = Torque reference 2 = Limit current	0	5-123

Param.	Description	Adjustable range	Factory setting	Page
P0741	AI1 MVC3 Gain	0.000 to 9.999	1.000	5-124
P0742	AI1 MVC3 Offset	-100.0 to 100.0 %	0.0 %	5-124
P0743	Modulation levels	0 = 3 Levels 1 = 5 Levels	0	5-124
P0744	AI2 MVC3 Funct.	0 = Not Used 1 = Field current	0	5-124
P0745	AI2 MVC3 Gain	0.000 to 9.999	1.000	5-124
P0746	AI2 MVC3 Offset	-100.0 to 100.0 %	0.0 %	5-125
P0936	Maximum torque	0 to 85 %	60 %	5-125
P0937	Minimum Speed	0 to 7200 rpm	900 rpm	5-125
P0940	Q Factor	0.0000 to 0.9999	0.9995	5-125
P0950	Motor Type	0 = Induction motor 1 = Synchronous motor with brushes 2 = Brushless synchronous motor 3 = Permanent magnet synchronous motor	0	5-125

NOTE!
Quick parameter reference notes:
(1) Parameter can be changed only with the inverter disabled (motor stopped).
(2) Values may change as a function of the ”Motor Parameters”.
(3) Values may change as a function of the parameter P0412 (Lr/Rr Constant).
(4) Values may change as a function of the parameter P0296 (Inverter rated voltage).
(5) Values may change as a function of the parameter P0295 (Inverter rated current).
(6) Values may change as a function of the parameter P0320 (Flying Start/ Ride-Through).
(7) Parameter can only be changed with input cubicle opened.

1.2 MESSAGES OF ALARMS AND FAULTS

The faults of the MVW01 can be subdivided into Alarms (Axxxx) and Faults (Fxxxx). In general, the alarms serve to indicate a situation that, if not corrected, can lead the inverter to a stop by fault. A signalized fault indicates a situation that caused the inverter to be disabled (the main circuit breaker may open or not, depending on the type of fault).

Fault/Alarm	Description	Page
A0001	Mains Low Voltage	8-1
A0002	Mains High Voltage	8-1
F0003	Under Voltage / Phase Loss	8-2
F0004	Mains Over Voltage	8-2
F0006	Mains unbalance/ loss of phase	8-2
F0007	Mains voltage feedback fault	8-2
A0008	Line Sync. Time Out	8-2
A0010	Rectifier high temperature alarm	8-2
F0011	Rectifier Over Temperature	8-2
F0012	Rectifier feedback temperature	8-2
F0013	Sin. Filter CB Feedback Fault	8-2
F0014	Circuit Breaker Closing Fault	8-2
F0015	Circuit Breaker Opening Fault	8-3
F0016	External Trip CB Protection	8-3
F0017	Circuit Breaker not Ready	8-3
A0018	Input Transform. Alarm	8-3
F0019	Input Transform. Fault	8-3
F0020	Pre-Charge Fault	8-3
F0021	DC Link Under Voltage	8-3
F0022	DC Link Over Voltage	8-3
F0023	DC Link Unbalance	8-3
F0024	DC Link Voltage Feedback Fault	8-3
F0025	Closing Doors Fault	8-4
F0026	Circuit Breaker not Ready	8-4
F0027	Improper opening of the input CB	8-4
F0030	IGBT1 ph U Fault or Short Circuit	8-4
F0031	IGBT2 ph U Fault or Short Circuit	8-4
F0032	IGBT3 ph U Fault or Short Circuit	8-4
F0033	IGBT4 ph U Fault or Short Circuit	8-4
F0034	IGBT1 ph V Fault or Short Circuit	8-4
F0035	IGBT2 ph V Fault or Short Circuit	8-4
F0036	IGBT3 ph V Fault or Short Circuit	8-4
F0037	IGBT4 ph V Fault or Short Circuit	8-4
F0038	IGBT1 ph W Fault or Short Circuit	8-5
F0039	IGBT2 ph W Fault or Short Circuit	8-5
F0040	IGBT3 ph W Fault or Short Circuit	8-5
F0041	IGBT4 ph W Fault or Short Circuit	8-5
F0042	Breaking IGBT 1 Fault or SC	8-5
F0043	Breaking IGBT 4 Fault or SC	8-5
F0044	Arc Detection	8-5
F0045	Electronic PS1 Fault	8-5
A0046	I x t Alarm	8-5
F0047	IGBT Overload Failure	8-5
F0048(5)	Air Cooling Fault	8-6

Fault/Alarm	Description	Page
A0050	Phase U heatsink high temperature	8-6
F0051	Phase U heatsink overtemperature	8-6
F0052	Phase U Heatsink Feedback Fault	8-6
A0053	Phase V heatsink high temperature	8-6
F0054	Phase V heatsink overtemperature	8-6
F0055	Phase V Heatsink Feedback Fault	8-6
A0056	Phase W heatsink high temperature	8-6
F0057	Phase W heatsink over temperature	8-6
F0058	Phase W Heatsink Feedback Fault	8-6
A0059	PhaseBR heatsink high temperature	8-7
F0060	PhaseBR heatsink over temperature	8-7
F0061	PhaseBR Heatsink Feedback Fault	8-7
F0062	Therm. Unbalance Phases U - V - W	8-7
F0063	Output Voltage U Feedback Fault	8-7
F0064	Output Voltage V Feedback Fault	8-7
F0065	Output Voltage W Feedback Fault	8-7
F0066	Null Current	8-7
F0067	Encoder or Motor Miswired	8-7
F0068	Test Mode Failure	8-7
F0069	Calibration Error	8-8
F0070	Overcurrent at output	8-8
F0071	Output Over Sw Current	8-8
F0072(5)	Output Over Load Ixt Function	8-8
A0073	Ground Fault	8-8
F0074	Ground Fault	8-8
F0075	Failure feedback of voltage between the Medium Point DC Link and ground	8-8
F0076	Motor Unbalanced Current	8-8
F0077	Breaking Resist. Overload	8-8
F0078(5)	Motor Over Temperature	8-9
F0079(5)	Encoder Fault	8-9
F0080	CPU Watchdog Error	8-9
F0083(5)	Inverter Setup Fault	8-9
A0084	Auto-Diagnosis Alarm	8-9
F0085	Electronic Power Supply Fault	8-9
F0087	Link MVC3 - MVC4 Failure	8-9
F0090(5)	External Fault DIx is Open	8-9
F0092	Pre-charge supply fault	8-9
A0093	Rectifier fan supply Fault - Set A	8-9
A0094	Inverter cooling system failure - set A	8-10
F0095	PS1 Supply Fault	8-10
A0096	4...20 mA Alarm	8-10
F0097(5)	4...20 mA Fault	8-10
F0099	Self Diagnosis Current OffSet	8-10
F0100	Fatal Error MVC3 Control Card	8-10
F0101(5)	Incomp. Software Version	8-10
F0102	EPLD generic failure	8-10
F0103	CC1 RAM Failure	8-10
F0104	CC1 A/D Failure	8-10
F0105	CC1 EEPROM Failure	8-11
F0106	Fatal Error MVC4 Control Card	8-11

Fault/Alarm	Description	Page
A0107	Feedback Alarm	8-11
A0108	Inverter Not Initialized	8-11
F0109	General Disable MVC3	8-11
A0110	Motor over temperature alarm	8-11
A0111	DIx External Alarm	8-11
F0112	Motor Over Speed	8-11
A0113	Rectifier Fan B Supply Fault	8-11
A0114	Inverter Fan B Supply Fault	8-12
F0115	Master-Slave Communic. Error	8-12
F0116	Slave Fail	8-12
F0117	Slave Current Unbalance	8-12
F0119	Timeout communic thermal relay	8-12
A0120	Fault in the temperature sensor of the thermal protection relay	8-12
F0121	Overtemperature detected by the thermal protection relay	8-12
A0122	Overtemperature detected by the thermal protection relay	8-12
A0123	Inverter Setup Alarm	8-12
A0124	Param. Change w/ Inv. Enabled	8-13
A0125	Read/Write in Inexistent Para.	8-13
A0126	Parameter Value Out of Range	8-13
A0127	Function not Cfg.for Fieldbus	8-13
F0128	Fieldbus Connec. Fault	8-13
A0129	Fieldbus Connec. Inactive	8-13
A0130	Inactive Fieldbus board	8-13
A0131(1)	Rectifier high temperature alarm 1p	8-13
F0132(1)	Rectifier Over Temperature 1p	8-13
F0133(1)	Rectifier feedback temperature 1p	8-14
F0134(1)	IGBT UAp 1 Fault or Short Circuit	8-14
F0135(1)	IGBT UAp 2 Fault or Short Circuit	8-14
F0136(1)	IGBT UAp 3 Fault or Short Circuit	8-14
F0137(1)	IGBT UAp 4 Fault or Short Circuit	8-14
F0138(1)	IGBT VAp 1 Fault or Short Circuit	8-14
F0139(1)	IGBT VAp 2 Fault or Short Circuit	8-14
F0140(1)	IGBT VAp 3 Fault or Short Circuit	8-14
F0141(1)	IGBT VAp 4 Fault or Short Circuit	8-14
F0142(1)	IGBT WAp 1 Fault or Short Circuit	8-14
F0143(1)	IGBT WAp 2 Fault or Short Circuit	8-14
F0144(1)	IGBT WAp 3 Fault or Short Circuit	8-15
F0145(1)	IGBT WAp 4 Fault or Short Circuit	8-15
F0146(1)	Breaking IGBT 1B Fault or SC	8-15
F0147(1)	Breaking IGBT 2B Fault or SC	8-15
F0148(1)(4)	PS1 2 power supply fault	8-15
A0149(1)	Phase UAp Heatsink high temperature	8-15
F0150(1)	Phase UAp Heatsink over temperature	8-15
F0151(1)	Phase UAp Heats. Feedback Fault	8-15
A0152(1)	Phase VAp Heatsink high temperature	8-15
F0153(1)	Phase VAp Heatsink over temperature	8-15
F0154(1)	Phase VAp Heats. Feedback Fault	8-16
A0155(1)	Phase WAp Heatsink high temperature	8-16
F0156(1)	Phase WAp Heatsink over temperature	8-16
F0157(1)	Phase WAp Heats. Feedback Fault	8-16

Fault/Alarm	Description	Page
A0158(1)	PhaseBRBheatsink high temperature	8-16
F0159(1)	PhaseBRBheatsink over temperature	8-16
F0160(1)	PhaseBRBHeatsink Feedback Fault	8-16
F0161(1)	Therm. Unbalance Phases Ap	8-16
F0162(1)	Output Volt. UAp Feedback Fault	8-16
F0163(1)	Output Volt. VAp Feedback Fault	8-16
F0164(1)	Output Volt. WAp Feedback Fault	8-17
A0165	Safety Stop is Active	8-17
F0166(2)	Therm. Unbalance Phases B	8-17
F0167(3)	Therm. Unbalance Phases Bp	8-17
F0168	Therm. Unbalance Rect 123	8-17
F0169	Therm. Unbalance Rect 123p	8-17
A0170	Rectifier 2 high temperature alarm	8-17
F0171(4)	Rectifier 2 Over Temperature	8-17
F0172	Rectifier 2 feedback temperature	8-17
A0173(4)	Rectifier 3 high temperature alarm	8-18
F0174(4)	Rectifier 3 Over Temperature	8-18
F0175(4)	Rectifier 3 feedback temperature	8-18
F0176(2)	IGBT UB 1 Fault or Short Circuit	8-18
F0177(2)	IGBT UB 2 Fault or Short Circuit	8-18
F0178(2)	IGBT UB 3 Fault or Short Circuit	8-18
F0179(2)	IGBT UB 4 Fault or Short Circuit	8-18
F0180(2)	IGBT VB 1 Fault or Short Circuit	8-18
F0181(2)	IGBT VB 2 Fault or Short Circuit	8-18
F0182(2)	IGBT VB 3 Fault or Short Circuit	8-18
F0183(2)	IGBT VB 4 Fault or Short Circuit	8-19
F0184(2)	IGBT WB 1 Fault or Short Circuit	8-19
F0185(2)	IGBT WB 2 Fault or Short Circuit	8-19
F0186(2)	IGBT WB 3 Fault or Short Circuit	8-19
F0187(2)	IGBT WB 4 Fault or Short Circuit	8-19
F0188(2)	Electronic PS1 3 Fault	8-19
A0189(2)	PhaseUB heatsink high temperature	8-19
F0190(2)	PhaseUB heatsink over temperature	8-19
F0191(2)	PhaseUB Heatsink Feedback Fault	8-19
A0192(2)	PhaseVB heatsink high temperature	8-19
F0193(2)	PhaseVB heatsink over temperature	8-20
F0194(2)	PhaseVB Heatsink Feedback Fault	8-20
A0195(2)	PhaseWB heatsink high temperature	8-20
F0196(2)	PhaseWB heatsink over temperature	8-20
F0197(1)	PhaseWB Heatsink Feedback Fault	8-20
F0198(2)	Output Volt. UB Feedback Fault	8-20
F0199(2)	Output Volt. VB Feedback Fault	8-20
F0200(2)	Output Volt. WB Feedback Fault	8-20
F0210(3)	IGBT UBp 1 Fault or Short Circuit	8-20
F0211(3)	IGBT UBp 2 Fault or Short Circuit	8-20
F0212(3)	IGBT UBp 3 Fault or Short Circuit	8-21
F0213(3)	IGBT UBp 4 Fault or Short Circuit	8-21
F0214(3)	IGBT VBp 1 Fault or Short Circuit	8-21
F0215(3)	IGBT VBp 2 Fault or Short Circuit	8-21
F0216(3)	IGBT VBp 3 Fault or Short Circuit	8-21

Fault/Alarm	Description	Page
F0217(3)	IGBT VBp 4 Fault or Short Circuit	8-21
F0218(3)	IGBT WBp 1 Fault or Short Circuit	8-21
F0219(3)	IGBT WBp 2 Fault or Short Circuit	8-21
F0220(3)	IGBT WBp 3 Fault or Short Circuit	8-21
F0221(3)	IGBT WBp 4 Fault or Short Circuit	8-21
F0222(3)	Electronic PS1 4 Fault	8-21
A0223(3)	Phase UBp Heatsink high temperature	8-22
F0224(3)	Phase UBp Heatsink over temperature	8-22
F0225(3)	Phase UBp Heats. Feedback Fault	8-22
A0226(3)	Phase VBp Heatsink high temperature	8-22
F0227(3)	Phase VBp Heatsink over temperature	8-22
F0228(3)	Phase VBp Heats. Feedback Fault	8-22
A0229(3)	Phase WBp Heatsink high temperature	8-22
F0230(3)	Phase WBp Heatsink over temperature	8-22
F0231(3)	Phase WBp Heats. Feedback Fault	8-22
F0232(3)	Output Volt. UBp Feedback Fault	8-22
F0233(3)	Output Volt. VBp Feedback Fault	8-23
F0234(3)	Output Volt. WBp Feedback Fault	8-23
F0236(4)	DC Link Unbalance V	8-23
F0237(4)	DC Link Unbalance W	8-23
F0238(4)	DC Link Over Voltage V	8-23
F0239(4)	DC Link Over Voltage W	8-23

NOTE!
Note found in the alarm and fault quick reference:
(1) Only frame size C, D and E models.
(2) Only frame size D and E models.
(3) Only frame size E models.
(4) Only frame size C1, C2 and C3 models.
(5) It does not open the circuit breaker.

2 SAFETY INSTRUCTIONS

This manual contains the necessary information for the correct use of the MVW01 frequency inverter.

It was written to be used by people with proper technical training or qualification to operate this kind of equipment.

This manual presents all the functions and parameters of the MVW01, but it is not intended to explain every possible application of the MVW01. WEG will not take any liabilities for applications not described in this manual.

This product is neither intended for applications whose purpose is to ensure physical integrity and/or life of people, nor for any other application in which a fault of the MVW01 may create a situation of risk to the physical integrity and/or life of people. The designer who applies the MVW01 must provide ways to ensure the safety of the installation even in case of a failure of the servo drive.

2.1 SAFETY WARNINGS IN THE MANUAL

The following safety notices are used in this manual:

DANGER!
Not following the procedures recommended in this warning can lead to death, serious injuries and considerable material damages.

WARNING!
Not following the procedures recommended in this warning can lead to material damages.

NOTE!
The text aims at providing important information for the complete understanding and proper operation of the product.

2.2 SAFETY WARNINGS ON THE PRODUCT

The following symbols are attached to the product as safety warnings:

High voltages are present.

Components sensitive to electrostatic discharge. Do not touch them.

Mandatory connection to the protective earth (PE).

Connection of the shield to the ground.

2.3 IDENTIFICATION LABEL OF THE MVW01

The identification label of the MVW01 is located inside the product Control Panel. The label contains important information on the inverter.

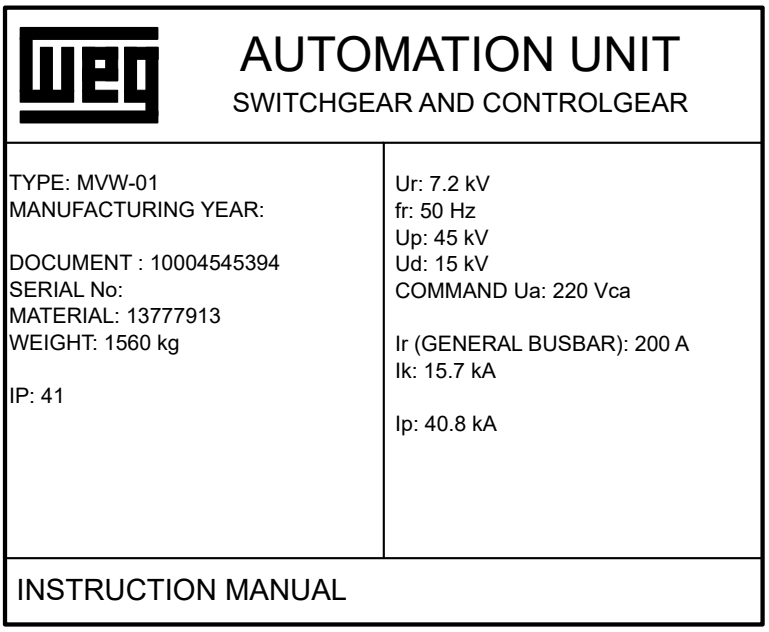


Figure 2.1: *MVW01 identification label (example)*

2.4 PRELIMINARY RECOMMENDATIONS

DANGER!
Only qualified personnel, familiar with the MVW01 inverter and related equipment must plan or perform the installation, commissioning, operation and maintenance of this equipment.
Such personnel must follow the safety instructions described in this manual and/or defined by local standards.
Failure to comply with the safety instructions may cause risk of death and/or equipment damage.

NOTE!
For the purposes of this manual, qualified personnel are those trained in order to be able to:
1. Install, ground, power up and operate the MVW01 in accordance with this manual and the safety legal procedures in force.
2. Wear/use protective equipment according to the standards in force.
3. Give first aid.

DANGER!
Always turn off the main power supply before touching any electrical component associated to the inverter.
Many components may remain charged with high voltages and/or moving parts (fans) even after the AC power supply input is disconnected or turned off.
Wait for at least ten minutes in order to guarantee the full discharge of the capacitors.
Always connect the equipment frame to the protective earth (PE) at the proper terminal.

WARNING!
Electronic boards have components sensitive to electrostatic discharges. Do not touch directly the component parts or connectors. If necessary, first touch the grounded metallic frame or use a proper grounding strap.

Do not execute any applied potential test on the inverter!
If necessary, contact WEG.

NOTE!
Frequency inverters may interfere with other electronic equipment. Follow the recommended procedures to minimize those effects.

NOTE!
Read the User's Manual completely before installing or operating this inverter.

3 GENERAL INFORMATION

This manual presents the necessary information for the configuration of all of the functions and parameters of the MVW01. This manual must be used together with the User's Manual.

3.1 ABOUT THE MANUAL

This manual contains chapters whith a logical sequence for the user to program and operate the MVW01:

This manual contains information about the setting and programming of WEG / MVW01 Medium Voltage Inverter. This document is arranged in dedicated and specific chapters that explain the proper setting, troubleshooting and functionalities of the equipment.

The characteristics and recommendations contained in this manual were based on models of the standard MVW01. It is worth of notice that, in addition to supplying standard products, WEG technical team - composed of distinct departments: Technical Sales, Contract Management, Engineering, Technical Assistance, among others - is qualified to develop and provide customized solutions according to the customers' needs and their specific applications.

The MVW01 may be engineered to meet the needs and technical specifications of our customers. Sizes, technical recommendations, performance data and optional items can be changed in relation to the information contained in this document.

In addition to the manual, the inverter detailed design is part of the documentation delivered to the customer. This design contains all the electrical, mechanical and setting information, as well as instructions for the interface/installation with other equipment.

The MVW01, as well as other WEG products, is in constant evolution in relation to both internal parts (hardware) and programming (software/firmware). Any further explanation about the equipment and its documentation can be obtained by means of WEG communication channels.

WEG is not liable for the improper use of the information contained in this manual.

3.2 SOFTWARE VERSION

The software version used on the MVW01 is important, since the software defines the functions and programming parameters. This manual refers to the software version as indicated on the back cover. For instance, the version 3.5X means from 3.50 to 3.59, where "X" are the evolutions in the software that do not affect the content of this manual.

3.2.1 Available Models

The MVW01 line of Medium Voltage inverters offers different models, classified according to their power cell rated voltage and current levels. Different models of the MVW01 may have different frames and codes. For constructive aspects of the available frames, check the User's Manual.

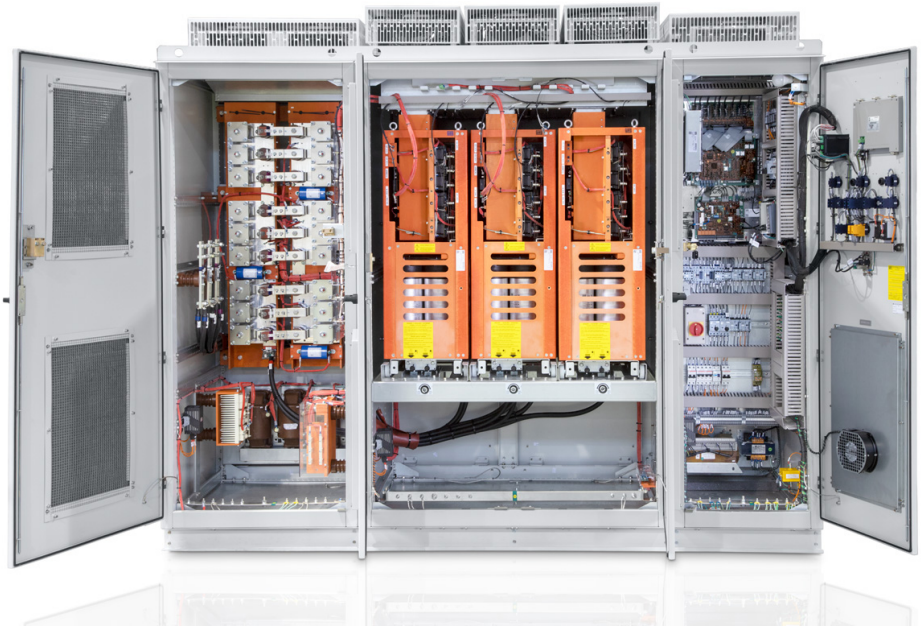


Figure 3.1: *General illustration of the MVW01*

WARNING!
It is very important to check that the inverter software version is the same as indicated on the first page of this manual.

4 HMI

The HMI (*Human Machine Interface*) provides a number of features to the MVW01 medium voltage frequency inverter, namely:

- View: view mode in text mode and graphic mode.
- Monitoring: up to 4 parameters can be monitored simultaneously on the screen.
- Navigation: menu navigation system with the addition of scroll bars and new keys.
- Help function *on-line*: help on HMI.
- Editing: new keys to speed up parameter editing.

The design, improvements and new functions have operation, navigation and programming similar to the WEG product line.

Figure 4.1: *HMI for the MVW3000 inverter*

4.1 USERS AND ACCESS LEVELS

Users allow access to certain inverter functions and settings. Passwords are informed in the commissioning service report.

Table 4.1: *Users and access levels*

User	Functions	Default password
OPERATION	Readings screen	5
	Graphics screen	
	Parameters screen	
	Read and write on parameters	
	Graphics screen settings	
MAINTENANCE	Graphics screen	31415
ASTEC	Firmware update	
	File backup	
	Remote access	
WEG	User access settings	
	Settings of the HMI operating system	

4.1.0.1 OPERATION

Access to commands via windows or settings menus, inverter operations and commands.

4.1.0.2 MAINTENANCE

Reading access to the settings of the HMI operating system and writing access to general settings.

4.1.0.3 ASTEC

Reserved for WEG technical assistance.

4.1.0.4 WEG

Reserved for WEG technical assistance.

4.2 VIEW MODES

In any use situation of the HMI (view mode or active screen) there are standard indications that are always displayed:

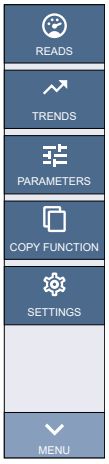
- Inverter status
- Help
- Language
- Login
- Date and time
- Local or remote mode
- Direction of rotation
- HMI speed reference
- Fault and alarm management

4.2.0.1 Standard screen

The HMI has a 10 inch screen, with navigation screens similar to Figure 4.2 on page 4-3.

Figure 4.2: *Standard screen.*

NOTE!
The print screen function can be enabled in the HMI settings.



The navigation is performed using the function menu that shows the shortcuts:

- Readings.
- Graphics.
- Parameters.
- *Copy* function.
- Settings.

Figure 4.3: *Function menu*

After power-up, the inverter *firmware* version is displayed, and the parameter transfer begins.

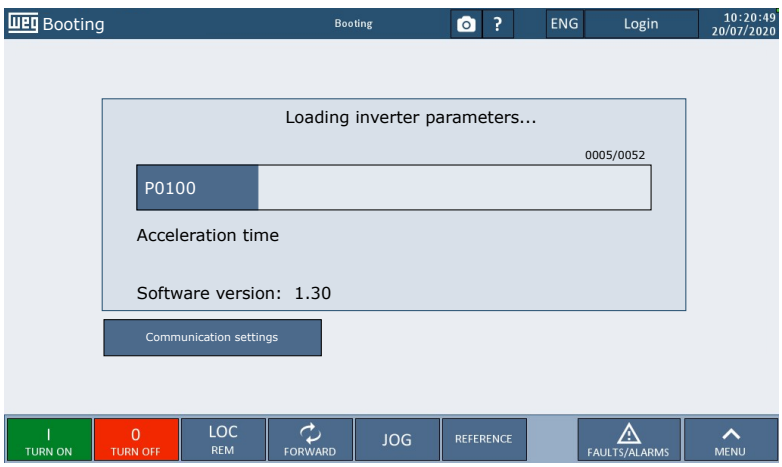


Figure 4.4: *HMI initialization*

After initialization is complete, the “Readings” navigation screen is displayed with three configurable view modes:

- Screen 01: 4 parameters, graphic view.
- Screen 02: 4 parameters, numerical view.
- Screen 03: 1 parameter, numerical view.

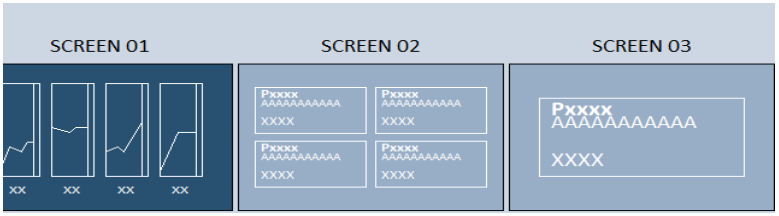


Figure 4.5: *Readings screen configuration*

4.3 KEYBOARDS

The Figure 4.6 on page 4-4 and the Figure 4.7 on page 4-4 show the numeric and alphanumeric keyboards.

Figure 4.6: *Numeric keyboard*

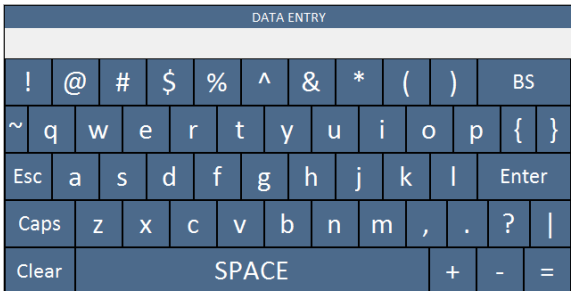


Figure 4.7: *Alphanumeric keyboard*

The keyboards are displayed automatically whenever needed; the type of keyboard is selected according to the function being performed.

4.4 READINGS

The readings screen is loaded after the inverter initialization and allows monitoring up to four parameters simultaneously.

Figure 4.8: *Shortcut to the readings screen*

It has three view modes with configurable parameters according to Figure 4.9 on page 4-5.

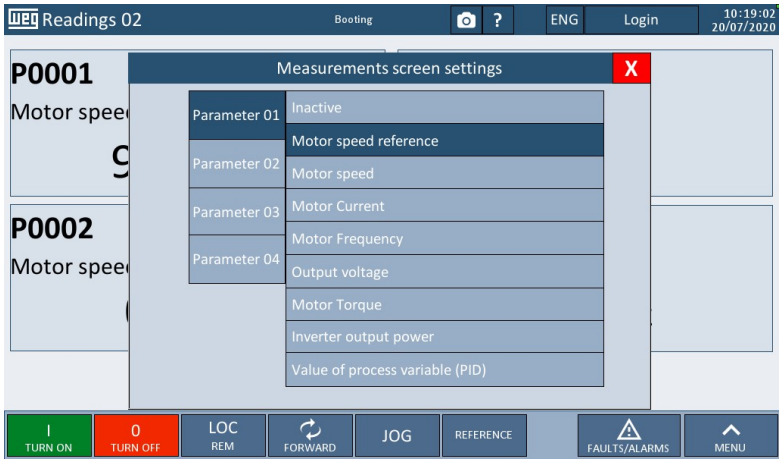


Figure 4.9: *Display settings*

4.4.0.1 Display settings

The settings can be changed at “MENU > SETTINGS > Home screen” or press directly on the parameter on the readings screen.

Available parameters:

- P0001 (Motor speed reference).
- P0002 (Motor Speed).
- P0003 (Motor Current).
- P0004 (DC Link Voltage).
- P0005 (Motor Frequency).
- P0009 (Motor Torque).
- P0010 (Inverter output power).
- P0040 (Value of process variable (PID)).

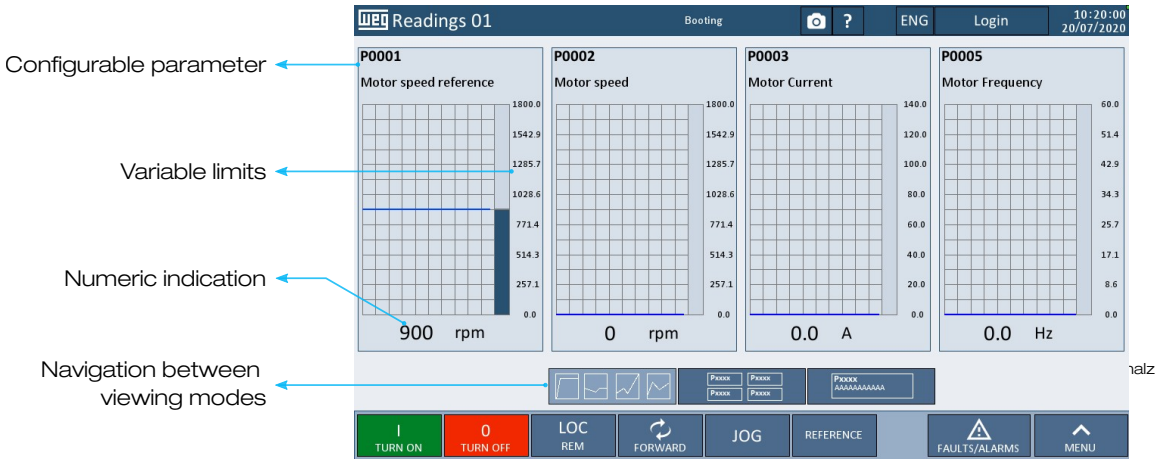


Figure 4.10: *Readings screen, view mode 01*

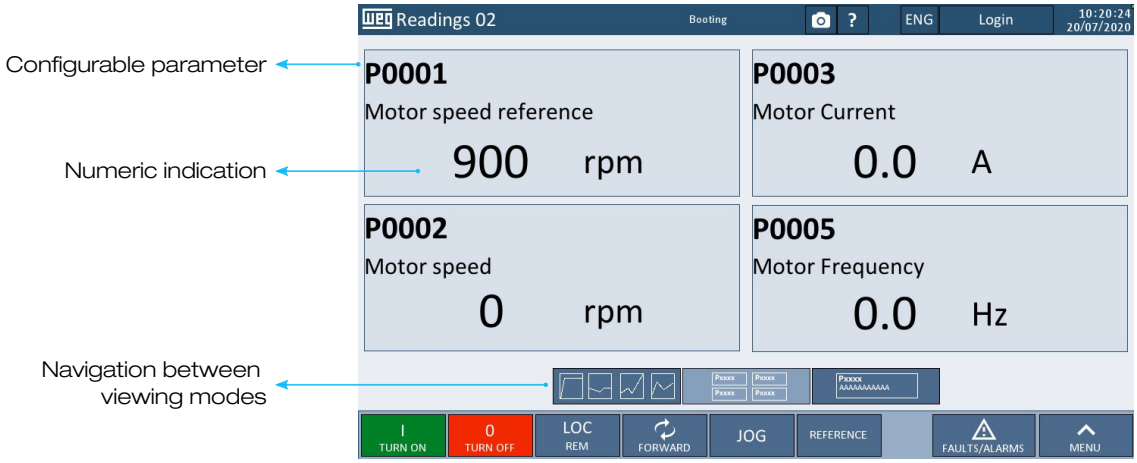


Figure 4.11: *Readings screen, view mode 02*

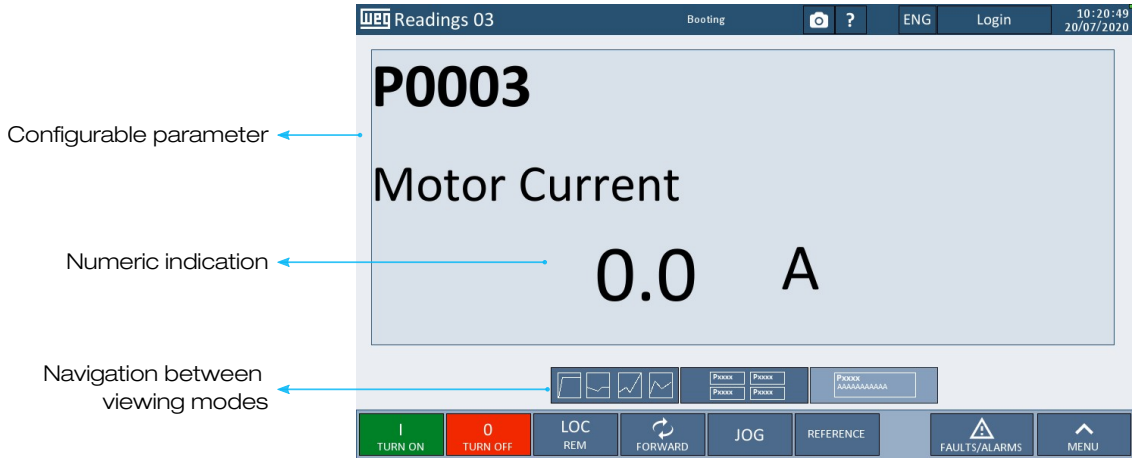


Figure 4.12: *Readings screen, view mode 03*

4.5 GRAPHICS

On the graphics screen, it is possible to monitor up to four parameters, whose data read are saved in files and stored for seven days on the HMI memory, and such data and can be exported to a USB disk.

Figure 4.13: *Shortcut to the graphics screen*

In the main screen there are the graphics, the current values of the parameters and buttons to configure the parameters and the limits of the channels.

Figure 4.14: Graphics screen

4

4.5.0.1 Set channels of the graphics function

In “Channel settings”, it is possible to set up to four channels, disabling or assigning a parameter of the reading parameters:

- Motor speed reference.
- Motor Speed.
- Motor Current.
- DC Link Voltage.
- Motor Frequency.
- Motor Torque.
- Inverter output power.
- Value of process variable (PID).

The time interval of the X axis defines the scale of the X axis. To save the new channel configuration, use the “Save data” button.

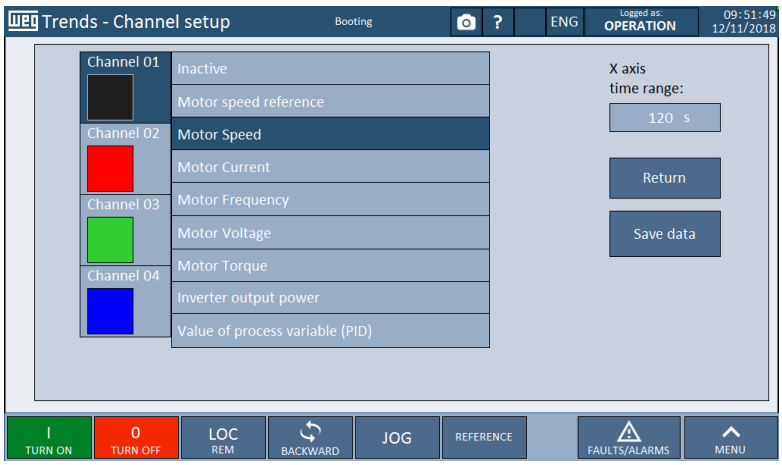


Figure 4.15: Channel settings

4.5.0.2 Graphic limits

When the “Limits” button is pressed, a window will pop up with four fields, one for each channel, where values from 0 to 200% can be entered.

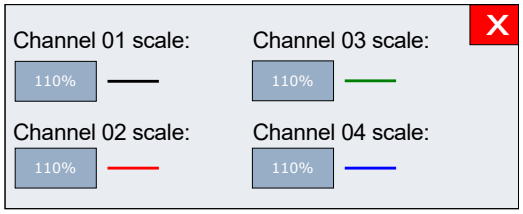


Figure 4.16: Graphic limits

4.6 PARAMETERS

It allows access to all setting parameters of the MVW01.

Figure 4.17: Button to access the parameters

The main structure of the parameter menu is shown in Table 4.2 on page 4-8.

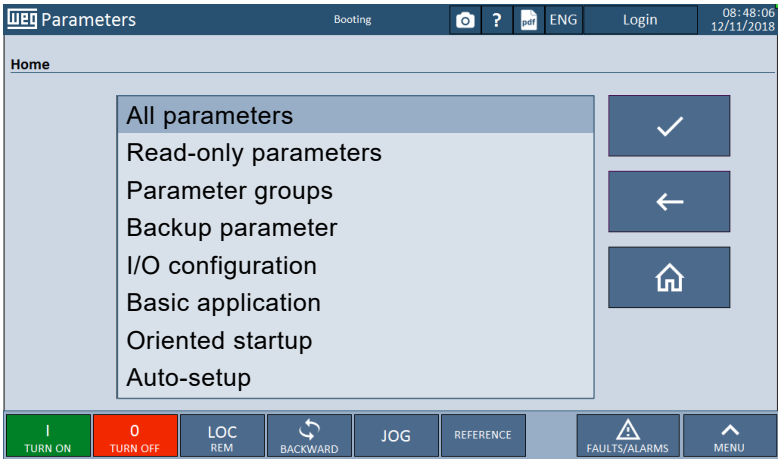


Figure 4.18: Parameter menu

Table 4.2: Groups accessed through the main menu

Menu	Parameters or Submenu to which access is given
All parameters	All parameters with access in sequential mode
Read only parameters	Access to read parameters only
Parameter groups	Parameters accessed by menus according to their function
Backup parameters	Parameters related to parameter copy functions
I/O configuration	Configuration parameters for digital and analog inputs and outputs
Basic application	Access to basic parameters
Oriented Startup	Easy access to configuration parameters

4.6.0.1 Parameter view

Up to five parameters are displayed simultaneously on the screen, and the table is separated by ID, description and parameter value.

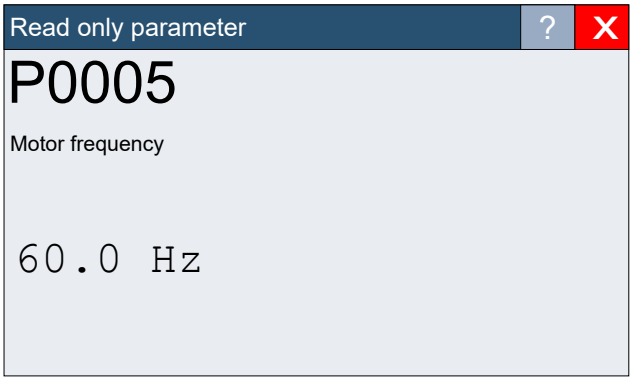
The “Search parameter” field allows searching for a parameter based on the ID. If the number does not exist, the existing parameter with the closest ID to the requested one will be displayed.

Figure 4.19: Parameter view screen

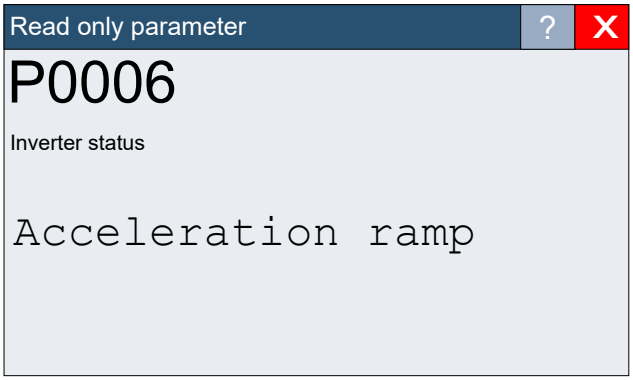
4.6.0.2 Reading parameters

In this display mode, it is possible to view the measured quantities and the inverter states.

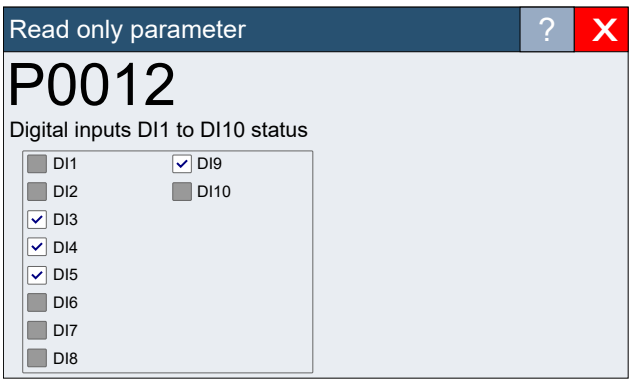
- Numerical view:



- Alphanumerical view:



- Bitfield view:

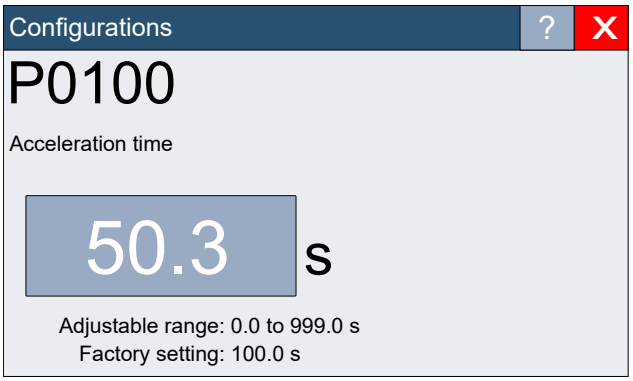


4

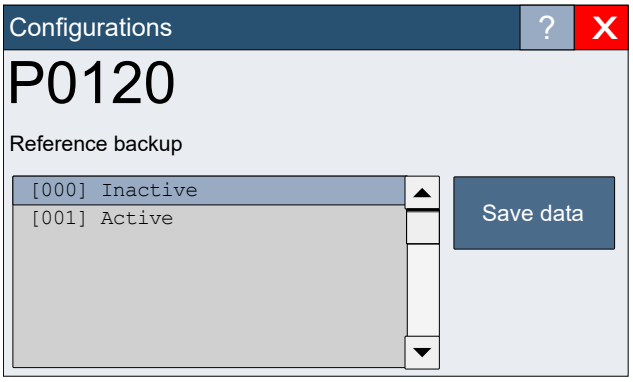
4.6.0.3 Configurable parameters

To access this type of parameter, it is necessary to perform *login*. The difference from the reading parameters is the possibility to change the values.

- Numerical edition:



- Alphanumerical edition:



4.6.0.4 Incompatibility between parameters

In case of incorrect setting of the inverter (see Table 4.3 on page 4-11), F0083 (Inverter Setup Fault) will be displayed.

Table 4.3: Incompatibility among parameters - F0083

1	Two or more parameters among P0264, P0265, P0266, P0267, P0268, P0269 and P0270 equal to 1 (LOC/REM)
2	Two or more parameters among P0265, P0266, P0267, P0268, P0269 and P0270 equal to 6 (2nd ramp)
3	P0265 equal to 8 and P0266 different from 8 or vice versa (Forward/Reverse)
4	P0221 or P0222 igual equal 8 (Multispeed) and P0266 ≠ 7 and P0267 ≠ 7 and P0268 ≠ 7
5	[P0221 = 7 and P0222 = 7] and [(P0265 ≠ 5 or P0267 ≠ 5) or (P0266 ≠ 5 or P0268 ≠ 5)] (with reference = E.P. and without DIx = accelerates E.P. or without DIx = decelerates E.P.)
6	[P0221 ≠ 7 or P0222 ≠ 7] and [(P0265 = 5 and P0267 = 5 or P0266 = 5 and P0268 = 5)] (without reference = E.P. and with DIx = accelerates E.P. or with DIx = decelerates E.P.)
7	P0265 or P0267 or P0269 equal to 14 and P0266 and P0268 and P0270 different from 14 (with DIx = Start, without DIx = Stop)
8	P0266 or P0268 or P0270 equal to 14 and P0265 and P0267 and P0269 different from 14 (without Start, with Stop)
9	P0220 > 1 and P0224 = P0227 = 1 and sem DIx = Gira/Para or DIx = 3WireStart|3WireStop and sem DIx = Habilita Geral
10	P0220 = 0 and P0224 = 1 and sem DIx = Gira/Para or 3WireStart|3WireStop and sem DIx = Habilita Geral
11	P0220 = 1 and P0227 = 1 and sem DIx = Gira/Para or 3WireStart|3WireStop and sem DIx = Habilita Geral
12	DIx = Start and DIx = Stop, porém P0224 ≠ 1 and P0227 ≠ 1
13	Two or more parameters among P0265, P0266, P0267, P0268, P0269 and P0270 equal to 15 (Man/Aut)
14	Two or more parameters among P0265, P0266, P0267, P0268, P0269 and P0270 equal to 18 (DC voltage regulator)
15	P0264 = 1 (DI2 = LOC/REM) and P0226 = 4 (selection of direction of rotation Remote situation via DI2
16	Two or more parameters among P0265, P0266, P0267, P0268, P0269 and P0270 equal to 17 (disable Flying Start)

4.7 SETTINGS

The HMI settings gathers all settings for functions and features. To access it, just use the maintenance login and then use the “Settings” button on the main menu.

Figure 4.20: Settings shortcut

4.7.0.1 Language, date and time

This screen allows the user to change the system date, time and language. It is also possible to change the time and date format:

- Time format, 12 or 24 hours
- Date format, DD/MM/YYYY or MM/DD/YYYY

Figure 4.21: *Language, date and time settings*

4.7.0.2 HMI settings

This screen shows the basic settings of the HMI, namely:

- Backlight time
- Screen brightness
- Activate the mouse pointer
- Activate the *Print Screen* function
- Hardware settings

To change “Hardware settings” and “Download USB”, the user must be logged in.

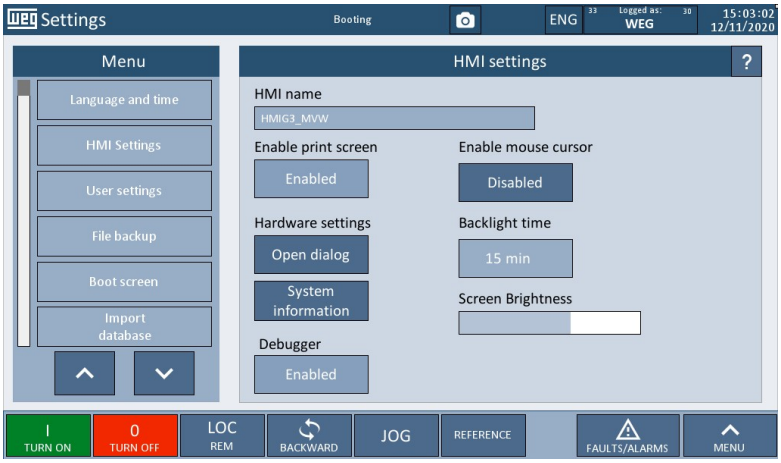


Figure 4.22: *HMI screen settings*

4.7.0.3 User settings

This screen allows editing names, passwords, privileges, add or delete users.

Only administrator users have access to these commands.

Figure 4.23: *User manager*

4.7.0.4 File backup

Graphic data, fault and alarm history can be exported to a USB disk via “Settings” menu.

In the “File backup” submenu, it is possible to save the graphic data, as shown in Figure 4.24 on page 4-13.

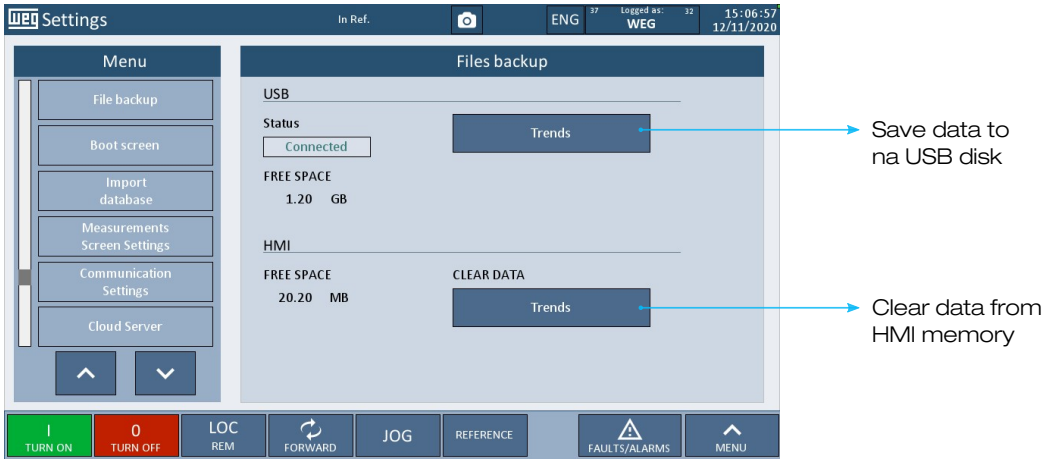


Figure 4.24: *Graphic backup screen*

The fault and alarm history is exported on the Fault and Alarm monitoring and management screen; see Section 4.8 FAULTS AND ALARMS on page 4-15.

Administrator privileges are required to clear graphic and fault and alarm history data.

4.7.0.5 Home screen

The home screen settings allow selecting a home screen, accessible by pressing the “Readings” button in the HMI menu. There are three screens that can be selected, as shown in Figure 4.5 on page 4-4. To change it, just select one of the three options; the blue color indicates the current settings.

4.7.0.6 Communication

It allows setting serial, ethernet and WI-FI communications.

- Serial: Displays settings and status of the HMI Modbus-RTU communication with the inverter.

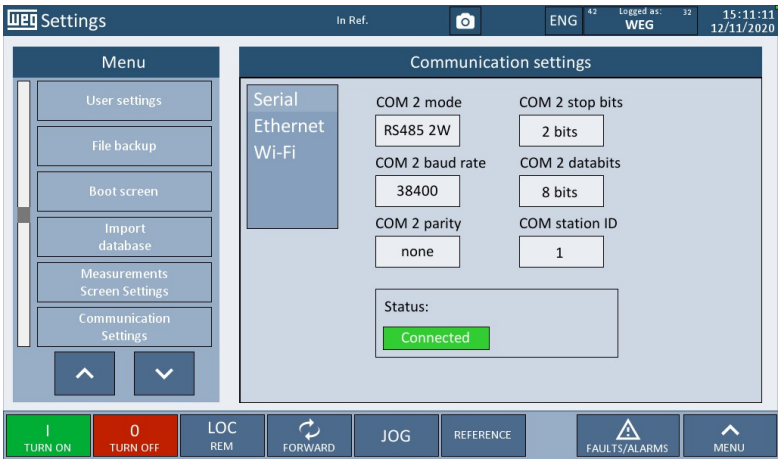


Figure 4.25: *Serial communication settings and status*

- Ethernet: Allows editing the Ethernet port settings, such as IP address, netmask, Gateway and DNS address.

Figure 4.26: *Ethernet port settings*

- WI-FI: Allows connection to a wireless network.

Figure 4.27: *WI-FI communication status and settings*

4.8 FAULTS AND ALARMS

In case of an event, a window appears showing the fault or alarm code and description, as per Figure 4.28 on page 4-15.

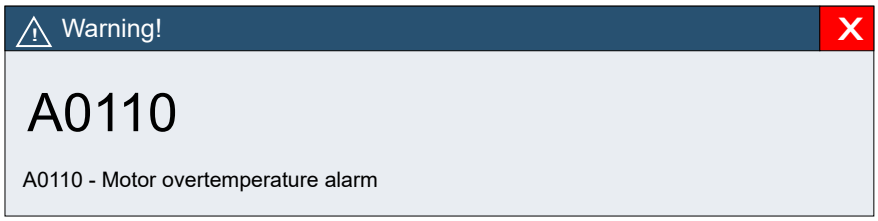


Figure 4.28: *Fault and alarm indication window*

4.8.0.1 Indicators

When a fault or an alarm is active, the button will signal as per Figure 4.29 on page 4-15.

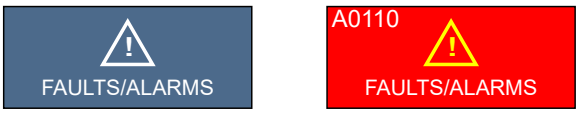


Figure 4.29: *fault and alarm indication*

The faults and alarms screen has the record of the last 100 faults and alarms, date, time and status of the inverter at the time of the event; it can be accessed via the “FAULTS/ALARMS” button.

Figure 4.30: *Fault and alarm history*

4.8.0.2 Information

The *Information* field displays a window with the data for the selected event. This window allows access to the “Online help” field, with information on the possible causes and solutions of the event.

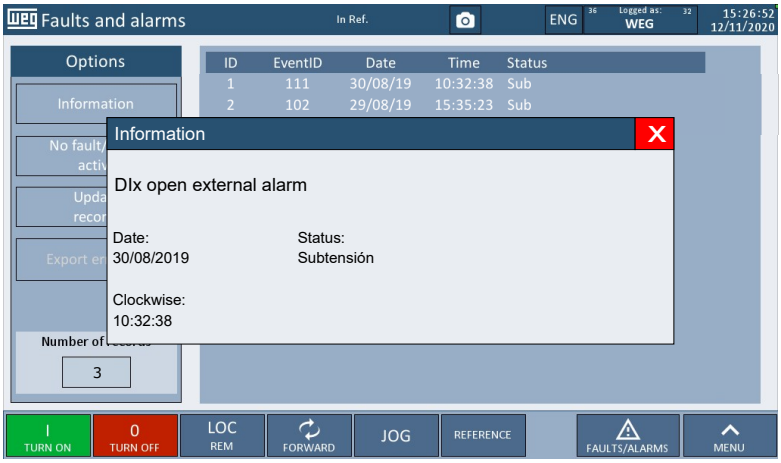


Figure 4.31: *Fault and/or alarm information window*

4

4.8.0.3 Export fault and alarm history

It exports a file with the list of faults and alarms, with the respective date, time and status information at the time of the event.

Figure 4.32: *Button to export the error log*

To use it, a USB disk must be connected to the HMI. The “Ready!” message indicates the saving of the file has ended.

5 DETAILED PARAMETER DESCRIPTION

This chapter describes in detail all the parameters of the inverter.

P0001 - Motor speed reference	
Resolution:	1 rpm

Description:

- It indicates the speed reference value in rpm (factory setting).
- Independent from the reference source origin (HMI, serial communication, analog input, among others).
- The indication scale can be changed via P0208 (Reference scale factor).

P0002 - Motor Speed	
Resolution:	1 rpm

Description:

- It indicates the real motor speed value in rpm (with filter with time constant of 0.5 s).
- The indication scale can be changed via P0208 (Reference scale factor).

P0003 - Motor Current	
Resolution:	0.1 A

Description:

- It indicates the motor current value in Amperes (A).
- The value is a result of the filter output with time constant defined in P0139 (Output current filter), default value P0139 = 0.2 s.
- When P0621 > 0 (sinusoidal filter), the motor current is estimated as a function of the sinusoidal filter.
- With P0621 > 0 the current measured in the inverter output can be seen in P0011.
- For line 2 x D and 2 x E, the HMI of the master rack indicates the sum of the currents of the slave inverters, and the HMIs of the slave racks indicate the current supplied to the motor for each inverter.

P0004 - DC Link Voltage	
Resolution:	1 V

Description:

- It shows the DC link actual voltage in Volts (V).
- P0004 is equal to the addition of P0052 (DC Link N Volt.) and P0053 (DC Link P Volt.) values.
- For line 2 x D and 2 x E, the HMI of the master rack indicates the highest voltage among the DC link of the slaves. The HMI of the slaves shows the present voltage on the DC link of each inverter.

P0005 - Motor Frequency	
Resolution:	0.1 Hz

Description:

- It indicates the inverter output frequency value in Hertz (Hz).

P0006 - VFD Status

Description:

- It indicates the actual inverter status.

Inverter possible states:

0 = 'Booting' indicates that the control board is waiting for the initialization end.

1 = 'Sub' indicates that the inverter has insufficient voltage for operation (undervoltage), and it does not accept the enabling command (inverter waiting for the pre-charge/power energization command).

2 = 'Inv. Ready' It indicates the inverter is ready to be enabled.

3 = 'Motor Mag.' indicates that the motor is being magnetized by DC current. This state lasts for twice the motor rotoric constant time (P0412).

4 = 'Motor Rdy.' indicates that the motor is magnetized and the inverter is waiting for the run command.

5 = 'Up Ramp' indicates the motor is in the speed acceleration ramp.

6 = 'Down Ramp' indicates that the motor is in the speed deceleration ramp.

7 = 'In Ref.' indicates that the motor is rotating at the adjusted speed reference.

8 = 'DC Break' indicates that the motor is stopping with DC braking.

9 = 'Coast' indicates that the motor is coasting, without being driven by the inverter.

10 = 'Ride Thro.' indicates that the inverter is operating during momentary line faults.

11 = 'Flying St.' indicates that the inverter has received a command to start a spinning motor. This state persists until the inverter reaches the motor speed.

12 = 'Test Mode' indicates that the inverter is in a transitory state to test mode or to self-tuning.

13 = 'Inv. Test' indicates that the inverter is in a general test state.

14 = 'Self-Comm.' Indicates that the inverter is performing the self-tuning, automatically measuring motor parameters.

15 = 'Power Test' indicates that the inverter is testing power cabinet specific processes.

16 = 'Fault' indicates the inverter is in a fault state.

17 = 'Alarm' indicates the inverter is in an alarm state.

18 = 'Calibrat.' indicates that the inverter is in the feedback signal calibration process.

19 = 'Hold' indicates that the inverter is in DC link regulation mode. Refer to the parameter P0151 description.

20 = 'I Limit' indicates that the inverter is in current limitation. Refer to the parameter P0169 description.

21 = 'I Fast Limit' indicates that the inverter is in fast current limitation.

22 = 'Ride Thr 2' indicates Ride-Through without interruption.

23 = 'Hold 2'.

24 = 'Sync Run' indicates that the inverter is trying to synchronize with the line.

25 = 'Fast Disab' indicates fast disable (HG = off) mode (MVC3).

26 = 'Sync OK' indicates that the inverter is synchronized with the line.

27 = 'Safety' indicates the inverter is in the safe stop mode.

28 = 'WaitComm' indicates the inverter is waiting for communication between master and slaves.

29 = 'Bypass'.

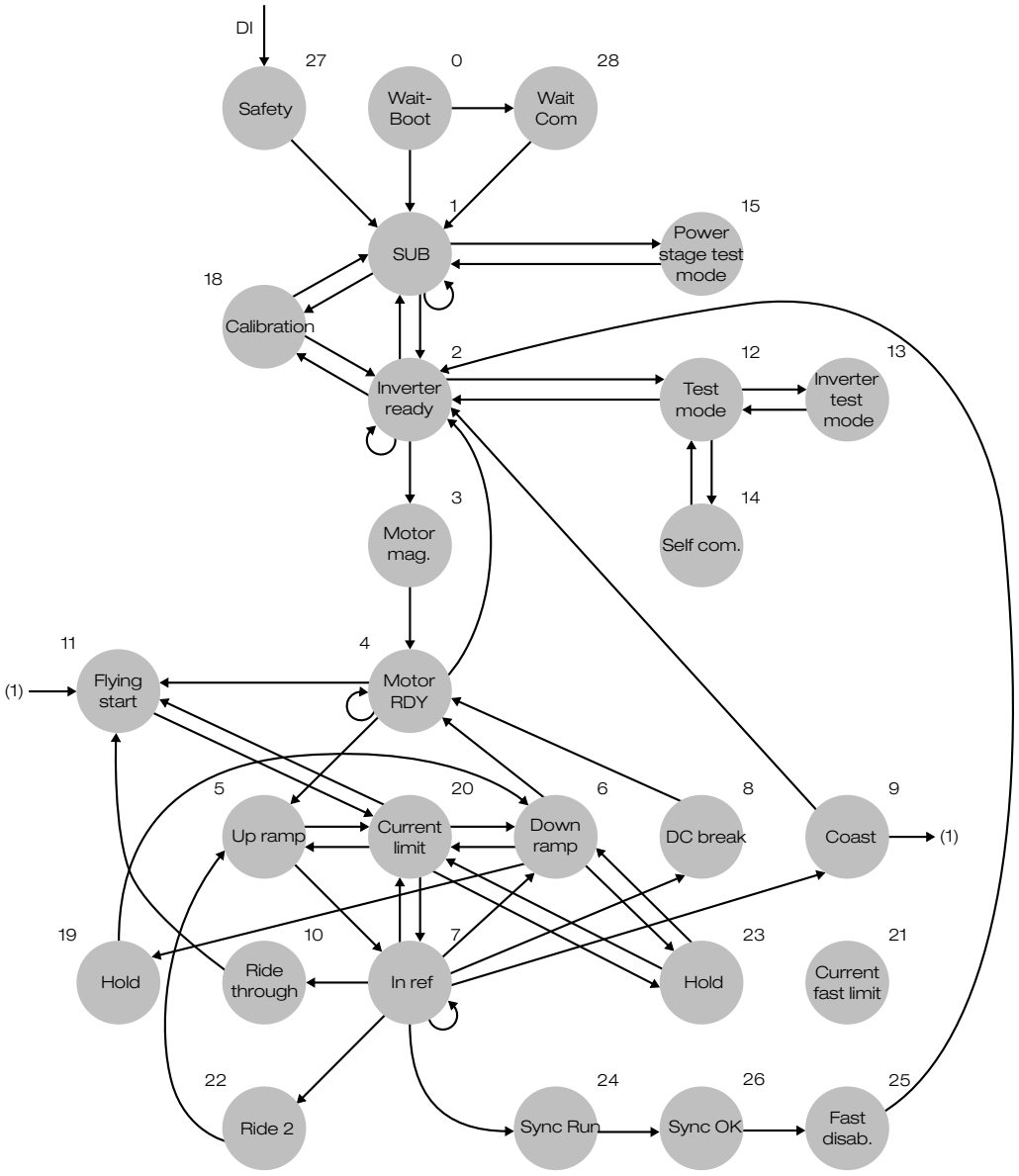


Figure 5.1: *State machine*

P0007 - Motor Voltage	
Resolution:	1 V

Description:

- It indicates the line voltage value at the inverter output in volts (V).
- It is calculated based on the modulation index and available voltage on the DC bus in each phase.

P0009 - Motor Torque

Resolution: 0.1 %

Description:

- It indicates the torque value produced by the motor.

It is calculated as follows:

$$P0009 = \frac{I_{tm} \times 100}{I_{tm_{rated}}}$$

Being:

I_{tm} = Present motor torque current.

5 Vector control mode:

$I_{tm_{rated}}$ = Rated motor torque current.

Scalar control mode:

$I_{tm_{rated}}$ = Rated inverter torque current.

P0010 - Inverter output power

Resolution: 1 kW

Description:

- It indicates the calculated value of the inverter output power in kW.

P0011 - Inverter Current

Resolution: 0.1 A

Description:

- It indicates the inverter output current, in ampères.

P0012 - Digital inputs DI1 to DI10 status

Description:

- It indicates, on the Graphic HMI, the status of the 8 digital inputs of the MVC4 control board (DI1 to DI6, DI9, DI10) and of the 2 digital inputs of the optional board (DI7, DI8) through the letters A (Active) and I (Inactive), in the following order:

DI1, DI2, ... ,DI7, DI8, DI9, DI10

Table 5.1: Digital inputs DI1 to DI10 status

Description	Bit
DI8	Bit 0
DI7	Bit 1
DI6	Bit 2
DI5	Bit 3
DI4	Bit 4
DI3	Bit 5
DI2	Bit 6
DI1	Bit 7
DI9	Bit 8
DI10	Bit 9

P0013 - Digital outputs DO1 to RL5 status

Description:

- It indicates, on the Graphic HMI, the status of the 2 digital outputs of the optional board (DO1, DO2) and of the 5 relay outputs of the MVC4 control board through the letters A (Active) and I (Inactive), in the following order:

DO1, DO2, RL1, RL2, RL3, RL4, RL5

Table 5.2: Digital outputs DO1 to RL5 status

Description	Bit
RL5	Bit 1
RL4	Bit 2
RL3	Bit 3
RL2	Bit 4
RL1	Bit 5
DO2	Bit 6
DO1	Bit 7

P0014 - Last Fault
P0015 - Second Fault
P0016 - Third Fault
P0017 - Fourth Fault

Description:

- They indicate, respectively, the codes of the last, last but one, last but two and last but three error occurred.
- To access more information about the error occurred, P0067 (Error Register).

P0018 - Input AI1
P0019 - Input AI2
P0020 - Input AI3
P0021 - Input AI4

Resolution: 0.1 %

Description:

- They indicate the values of analog inputs AI1 and AI2 of the MVC4 control board, AI3 of the EBB board and AI4 of the EBA board in percentage of the full scale.
- The indicated values are obtained after addition of the offset and multiplication by the gain.
- See the description of parameters P0234 (AI1 Gain) to P0247 (AI4 Offset).
- Analog input AI2 has a filter that distinguishes it from others (see P0248 (AI2 Filter)).

P0022 - Temperature on MVC3 board

Resolution: 0.1 °C

Description:

- It indicates the temperature value on the MVC3 control board in degrees Celsius (°C).

P0023 - Software version of MVC4 board

Description:

- It indicates the software version contained in the microcontroller memory located on the MVC4 control board.

P0024 - A/D conversion value of AI4

Description:

- Indica o resultado da conversão A/D, da entrada analógica AI4 localizada no cartão opcional.

P0025 - Iv current

P0026 - Iw current

P0027 - Iu current

Resolution: 0.1 A

Description:

- Indicate the rms value of the respective phase current.

P0028 - Input AI5

Resolution: 0.1 %

Description:

- It indicates the value of analog input AI5 of the MVC4 control board in percentage of full scale. The indicated values are obtained by means of addition of the offset and multiplication by the gain.
- See description of parameters P0721 to P0724.

P0029 - Trace function status

Description:

- It indicates the state of the trace function.

Table 5.3: *Trace function status*

P0029	Function
0	Inactive
1	Running
2	Triggered
3	Concluded

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0030 - Temperature register channel 1
P0031 - Temperature register channel 2
P0032 - Temperature register channel 3
P0033 - Temperature register channel 4
P0034 - Temperature register channel 5
P0035 - Temperature register channel 6
P0036 - Temperature register channel 7
P0037 - Temperature register channel 8
Resolution: 1 °C

Description:

- For these parameters indicate the motor temperature properly, the temperature control module (Tecsystem, Pextron) must be installed observing the recommendations contained in its manual.
- The overtemperature alarm and fault levels are configured directly on the temperature control module according to its manual.

The module serial configuration must be set as follows:

- Baudrate: 2400 bps
- Slave address: 1
- Parity: even
- Stop bit: 1

WARNING!
In the **PRG** (programming) and **VIS** (programming visualization) functions of the thermal protection relay, the communication with the inverter is temporarily disabled and can cause a communication time-out, in this situation the inverter disables the output, protecting the motor from possible damage.

NOTE!
This parameter is only visible on the HMI when: the Temperature Register function is active, P0315 = 1 (TecSystem) or P0315 = 2 (Pextron).

P0040 - Value of process variable (PID)
Resolution: 0.1 %

Description:

- It indicates the value of the process variable in % (factory setting) used as the PID feedback.
- The scale can be changed through P0528 and P0529.
- See the detailed description in Section 6.2 PID REGULATOR on page 6-4.

NOTE!
This parameter is only visible on the HMI when: the PID function is active, P0203 = 1 (PID Reg.) or P0203 = 3 (Trace+PID).

P0041 - Active redundant ventilation set

Description:

- It indicates the status of the redundant ventilation.
- The states 4 and 5 occur when both the sets have failed. In this case the inverter must be powered off and the defective fans must be repaired or replaced. After such procedure, the redundant ventilation function must be reset - refer to P0140.

Table 5.4: *Active redundant ventilation set*

P0041	Function
0	Set A is active
1	Set B is active
2	Set A active - B failed
3	Set B active - A failed
4	Set A active - A and B have failed
5	Set B active - A and B have failed
6	Set A automatic test
7	Set B automatic test

NOTE!
This parameter is only visible on the HMI when the redundant ventilation function is actived, P0140 > 0.

P0042 - Time powered counter

Resolution: 1 h

Description:

- It indicates the total hours the inverter remained powered.
- This value is kept even when the inverter is powered down.

P0043 - Time enabled counter

Resolution: 0.1 h

Description:

- It indicates the total hours the inverter remained enabled.
- It indicates up to 6553 hours; after this value, it returns to zero.
- Setting P0204 = 3 (Reset P043), the value of parameter P0043 goes to zero.
- This value is kept even when the inverter is powered down.

P0044 - MWh Counter

Resolution: 1 MWh

Description:

- It indicates the energy consumed by the motor.
- It indicates up to 11930 MWh; after this value, it returns to zero.
- Setting P0204 = 4 (Reset P044), the value of P0044 goes to zero.
- This value is kept even when the inverter is powered down.

P0045 - Graphic HMI software version

Description:

- It indicates the software version contained in the microcontroller memory located in the HMI .

P0046 - Junction temperature

Resolution: 0.1 °C

Description:

- It indicates the theoretical junction temperature of the IGBTs.

P0047 - Phase UAp temperature
P0048 - Phase VAp temperature
P0049 - Phase WAp temperature

Resolution: 0.1 °C

Description:

- Indicate the temperature in degrees Celsius on the power arm.

P0050 - BRAp Phase temperature

Resolution: 0.1 °C

Description:

- It indicates the temperature on the arm of the braking circuit in degrees Celsius.
- When the braking arm (optional) is not present shows 0.0 ?C.

P0051 - Rectifier 1p temperature

Resolution: 0.1 °C

Description:

- It indicates the heatsink temperature, in Celsius degrees.

P0052 - DC Link N Volt.
P0053 - DC Link P Volt.

Resolution: 1 V

Description:

- It indicates the DC link actual voltage, in Volts.

P0055 - Phase U temperature
P0056 - Phase V temperature
P0057 - Phase W temperature

Resolution: 0.1 °C

Description:

- Indicate the temperature in degrees Celsius on the power arm.

P0058 - BR Phase temperature

Resolution: 0.1 °C

Description:

- It indicates the temperature on the arm of the braking circuit in degrees Celsius.
- When the braking arm (optional) is not present shows 0.0 °C.

P0059 - Rectifier temperature

Resolution: 0.1 °C

Description:

- It indicates the heatsink temperature, in Celsius degrees.

P0060 - Fifth Fault
P0061 - Sixth Fault
P0062 - Seventh Fault
P0063 - Eighth Fault
P0064 - Ninth Fault
P0065 - Tenth Fault

Description:

- These parameters indicate the error code of the fifth, sixth, seventh, eighth, ninth and tenth errors, respectively.
- To access more information about the error occurred, P0067 (Error Register).

P0066 - MVC3 board software version

Description:

- It indicates the software version contained in the CPU of the MVC3 board.

P0068 - Present fault
P0069 - Present Alarm

Description:

- Alarm (P0069) or fault (P0068) number that occasionally be present at the inverter.

P0070 - Status of DIs MVC3 DI1, DI2, ..., DI16

Description:

- It indicates, on the Graphic HMI, the status of 16 digital inputs of the MVC3 control board (DI1 to DI16), by means of the letters A (Active) and I (Inactive), in the following order:

DI1, DI2, ... , DI15, DI16

Table 5.5: *Status of DIs MVC3 DI1, DI2, ..., DI16*

Description	Bit
DI16 - State of mechanically locked doors	Bit 0
DI15 - Safety stop	Bit 1
DI14 - Cooling system power supply alarm	Bit 2
DI13 - General enable	Bit 3
DI12 - Inverter main transformer fault	Bit 4
DI11 - Inverter main transformer alarm	Bit 5
DI10 - Cooling system power supply alarm	Bit 6
DI9 - Rectifier ventilation alarm	Bit 7
DI8 - PS1 power supply fault	Bit 8
DI7 - Pre-charge power supply fault	Bit 9
DI6 - Reserved	Bit 10
DI5 - Enabling of the input protection	Bit 11
DI4 - Circuit breaker OFF state	Bit 12
DI3 - Circuit breaker ON state	Bit 13
DI2 - Circuit breaker ready	Bit 14
DI1 - Power ON (Start pre-charge)	Bit 15

P0071 - Status of the MVC3 DOs RL1 to RL8

Description:

- It indicates, on the Graphic HMI, the status of the 8 relay outputs of the MVC3 control board, by means of the letters A (Active) and I (Inactive), in the following order:

RL1, RL2, ... , RL7, RL8

Table 5.6: *Status of the MVC3 DOs RL1 to RL8*

Description	Bit
RL8 - Lock doors if Link greater than 50 V	Bit 0
RL7 - 1st stage pre-charge	Bit 1
RL6 - Close input circuit breaker	Bit 2
RL5 - Open income circuit-breaker	Bit 3
RL4 - 2nd stage pre-charge	Bit 4
RL3 - Income circuit-breaker ON	Bit 5
RL2 - Turn on inverter cooling	Bit 6
RL1 - Inverter Ready	Bit 7

P0072 - Vab Voltage

P0073 - Vcb Voltage

Resolution: 1 V

Description:

- It indicates the line voltage at the input inverter, in Volts.

P0074 - Voltage in the transformer secondary

Resolution: 1 V

Description:

- It indicates the voltage modulus of the input transformer secondary star winding, in Volts.

P0075 - MP-GND Voltage

Resolution: 0.1 %

Description:

- It indicates the voltage between the DC link medium point (PM) and the ground (GND), in %.

NOTE!
100 % is equivalent to the line voltage of the an input ransformer secondary winding. Except for modules with 18-pulse rectifier or line 6.9 kV.

P0076 - i x t Overload

Resolution: 0.1 %

Description:

- It indicates the overload percentage value given by parameters P0156, P0157 and P0158.
- The actuation of the overload fault (F0072) occurs when P0076 reaches 100 %.

P0077 - Motor field current

Resolution: 0.1 A

Description:

- It indicates the field current value of the synchronous motor.

NOTE!
This parameter is only visible on HMI when: P0950 = 1 (Synchronous motor with brushes) or P0950 = 2 (Brushless synchronous motor).

P0078 - Excit. Voltage

Resolution: 1 V

Description:

- It indicates the field voltage of the brushless synchronous motor.

NOTE!
This parameter is only visible on the HMI when: P0950 = 2 (Brushless synchronous motor).

P0079 - Synchronous motor shaft position

Resolution: 1 °

Description:

- It indicates the shaft position of the synchronous motor.
- The Graphic HMI shows the position in degrees between 0° and 360°.
- Resolution = 1.4°.

NOTE!
8 most significant bits = number of turns.
8 least significant bits = position within the same turn.

NOTE!
This parameter is only visible on HMI when: P0950 = 1 (Synchronous motor with brushes) or P0950 = 2 (Brushless synchronous motor).

P0082 - Phase UB temperature
P0083 - Phase VB temperature
P0084 - Phase WB temperature
P0085 - Phase UBp temperature
P0086 - Phase VBp temperature
P0087 - Phase WBp temperature
Resolution: 0.1 °C

Description:

- Indicate the temperature in degrees Celsius on the power arm.

P0088 - Rectifier 2 temperature
P0089 - Rectifier 3 temperature
Resolution: 0.1 °C

Description:

- It indicates the heatsink temperature, in Celsius degrees.

P0092 - V DC Link N
P0093 - V DC Link P
P0094 - W DC Link N
P0095 - W DC Link P
Resolution: 1 V

Description:

- It indicates the DC link actual voltage, in Volts.

P0100 - Acceleration time			
P0101 - Deceleration time			
P0102 - Acceleration time 2nd ramp			
P0103 - Deceleration time 2nd ramp			
Adjustable range:	0.0 to 999.0 s	Factory setting:	P0100 = 100.0 s P0101 = 180.0 s P0102 = 100.0 s P0103 = 180.0 s

Description:

- Setting 0.0 means without use of ramp. In this case a voltage step will be applied to the motor proportional to the programmed speed reference.
- It defines the times to accelerate linearly from 0 to Maximum speed reference (P0134) or decelerate linearly from the Maximum speed reference to 0.
- The switching to the second ramp is done through one of the digital inputs DI3 to DI10 if it is programmed for the 2nd ramp function. Refer to parameters from P0265 to P0272.

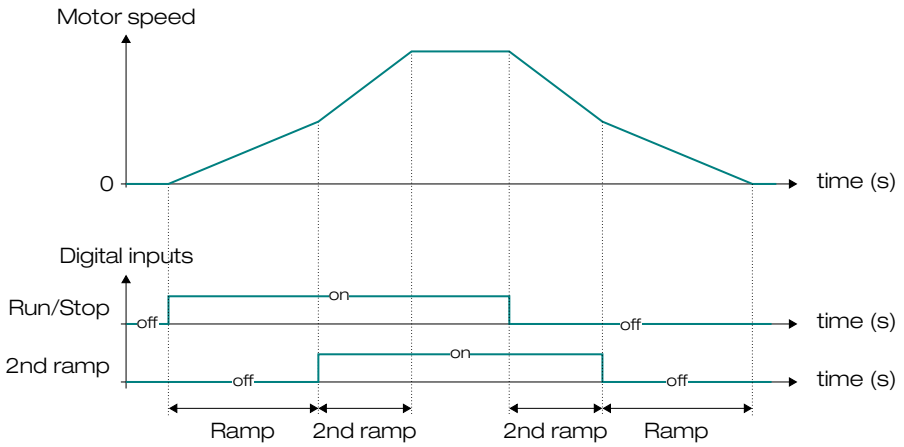


Figure 5.2: *2nd ramp*

P0104 - S Ramp			
Adjustable range:	0.0 to 100.0 %	Factory setting:	0.0 %

Description:

- This parameter allows the acceleration and deceleration ramps to have a non-linear profile, similar to an “S”.

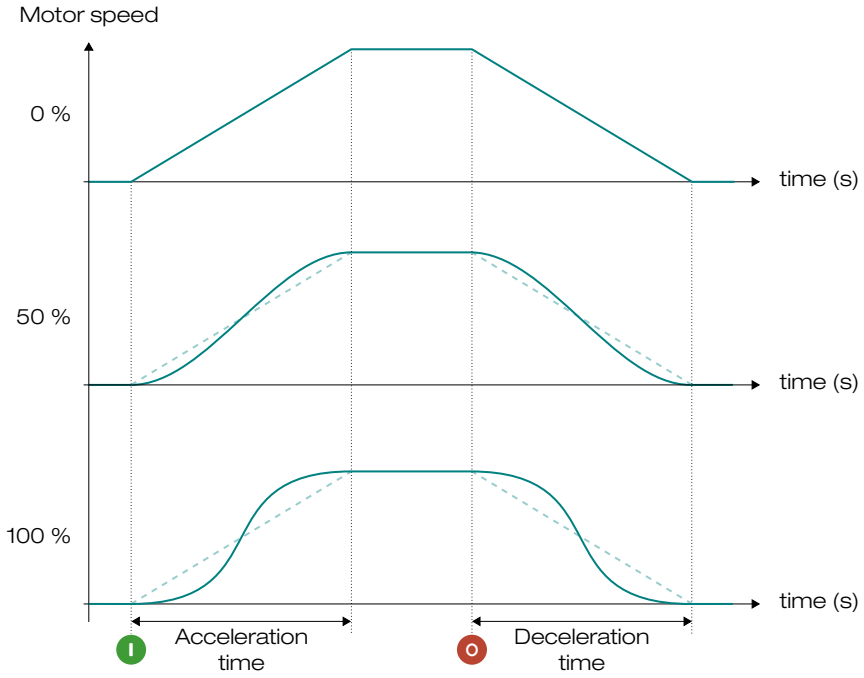


Figure 5.3: *S or Linear Ramp*

$$P0104 = \frac{t_{ramps}}{t_{acel}} \times 100\ \% = \frac{(t_{acel} - t_{linear})}{t_{acel}}, \text{ in the accelerations, or}$$

$$P0104 = \frac{t_{ramps}}{t_{decel}} \times 100\ \% = \frac{(t_{decel} - t_{linear})}{t_{decel}}, \text{ in the decelerations.}$$

Being:

t_{acel} = acceleration time, defined by P0100 or P0102.
t_{decel} = deceleration time, defined by P0101 or P0103.
t_{ramps} = S ramp time.
t_{linear} = linear ramp time.

- Setting 0.0 % means inactive function. In this case, only the linear ramp will be used.
- S ramp reduces mechanical shocks during accelerations or decelerations.

P0119 - Reac. Reference			
Adjustable range:	-99.99 to 99.99 %	Factory setting:	0.00 %

Description:

- It defines the external reference for the reactive current of the synchronous motor.
- For negative values, the reference of the reactive current will be capacitive. For positive values, it will be inductive.

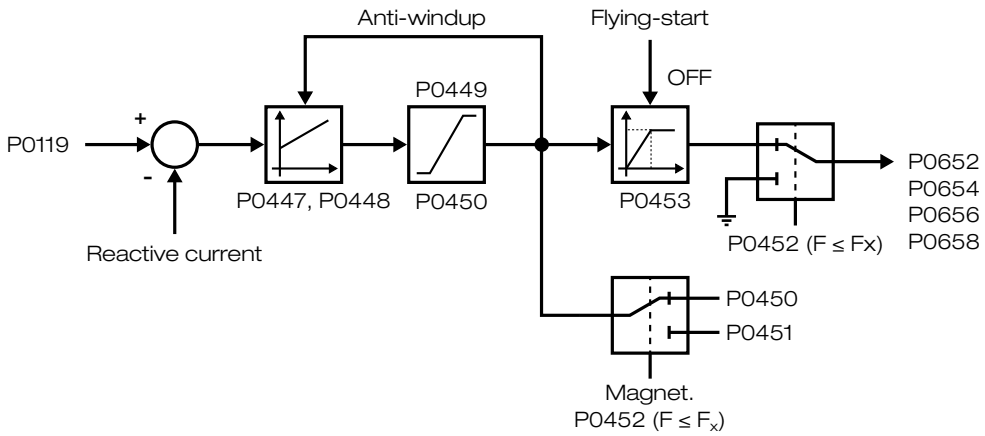


Figure 5.4: *Analog signal of the field current to be used on the motor*

5

NOTE!
This parameter is only visible on the HMI when: P0950 > 0.

P0120 - Reference Backup			
Adjustable range:	0 to 1	Factory setting:	1

Description:

- It defines whether the Speed Reference Backup function is Active (1) or Inactive (0).
- Se P0120 = Inactive, then the inverter will not save the reference value when it is disabled, i.e., when the inverter is enabled again, the speed reference will be the minimum speed.
- This backup function is applied only to the reference via HMI.

Table 5.7: *Reference Backup*

P0120	Function
0	Off
1	On

P0121 - HMI speed reference			
P0122 - Speed reference for JOG or JOG+			
P0123 - Speed reference for JOG-			
Adjustable range:	P0121 = 0 to 7200 rpm P0122 = 0 to 8192 rpm P0123 = 0 to 8192 rpm	Factory setting:	P0121 = 90 rpm P0122 = 150 rpm P0123 = 150 rpm

Description:

- The motor speed reference will adopt the value set in P0121 if P0221 = 0 (Service HMI) or P0222 = 0 (Service HMI).
- When P0120 = 1 (On), the value of P0121 is kept in the last value set even de-energizing the inverter.
- Activation of JOG function:

Table 5.8: Selection of JOG command via digital input

JOG key	Digital inputs DI1 to DI3 (P0255 = 2 and/or P0228 = 2)
P0225 = 1 and/or P0228 = 1	DI3 - P0265 = JOG or DI4 - P0266 = JOG or DI5 - P0267 = JOG or DI6 - P0268 = JOG or DI7 - P0269 = JOG or DI8 - P0270 = JOG or DI9 - P0271 = JOG or DI10 - P0272 = JOG

- When activating the JOG function, the motor will accelerate until reaching the value defined in P0122, following the adjusted ramp.
- The direction of rotation is defined by the direction of rotation function (P0223 or P0226).
- The JOG command is only effective with the motor stopped.
- Activation of JOG + function:

Table 5.9: Selection of JOG + command

Digital Inputs	Parameters
DI3 to DI10	P0265 to P0272 = JOG +

- Activation of JOG - function:

Table 5.10: Selection of JOG - command

Digital Inputs	Parameters
DI3 to DI10	P0265 to P0272 = JOG-

- When activating the JOG+/JOG- function, the speed reference in P0122/P0123 will be added (without ramp) to the other references to generate the total reference - see Figure 5.24 on page 5-43.

P0124 - Multispeed reference 1
P0125 - Multispeed reference 2
P0126 - Multispeed reference 3
P0127 - Multispeed reference 4
P0128 - Multispeed reference 5
P0129 - Multispeed reference 6
P0130 - Multispeed reference 7
P0131 - Multispeed reference 8

Adjustable range:	0 to 4095 rpm	Factory setting:	P0124 = 90 rpm P0125 = 300 rpm P0126 = 600 rpm P0127 = 900 rpm P0128 = 1200 rpm P0129 = 1500 rpm P0130 = 1800 rpm P0131 = 1650 rpm

Description:

- These parameters (P0124 to P0131) will only be displayed when P0221 = 8 and/or P0222 = 8 (Multispeed).
- The Multispeed is used when up to 8 preset fixed speeds are desired.
- When only 2 or 4 speeds are to be used, any input combination among DI4, DI5 and DI6 may be used.

- Check the speed reference parameters, according to the DIs used.
- The Multispeed offers the advantages of stability of the preset fixed references and the immunity against electric noise (isolated digital inputs DIx).
- Multispeed function active when P0221 or P0222 = Multispeed.
- It allows the output speed control relating the values defined by parameters P0124 to P0131 through the logical combination of digital inputs (DIx).

Table 5.11: *Selection of the Multispeed function via digital inputs*

DIx enabled	Programming
4	P0266 = 7
5	P0267 = 7
6	P0268 = 7

Table 5.12: *Multispeed Reference*

8 speeds			Speed reference
	4 speeds		
		2 speeds	
DI6	DI5	DI4	
0	0	0	P0124
0	0	1	P0125
0	1	0	P0126
0	1	1	P0127
1	0	0	P0128
1	0	1	P0129
1	1	0	P0130
1	1	1	P0131

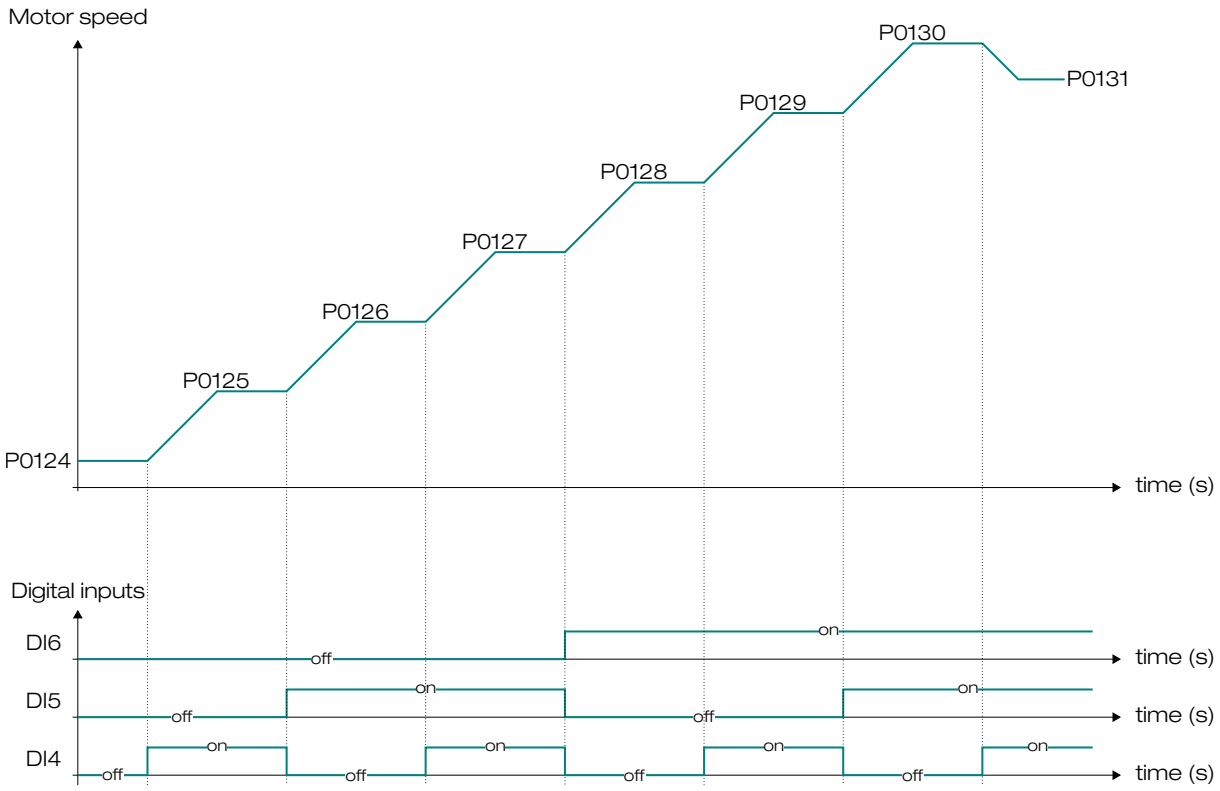


Figure 5.5: *Multispeed*

P0132 - Maximum overspeed level			
Adjustable range:	0 to 100 %	Factory setting:	10 %

Description:

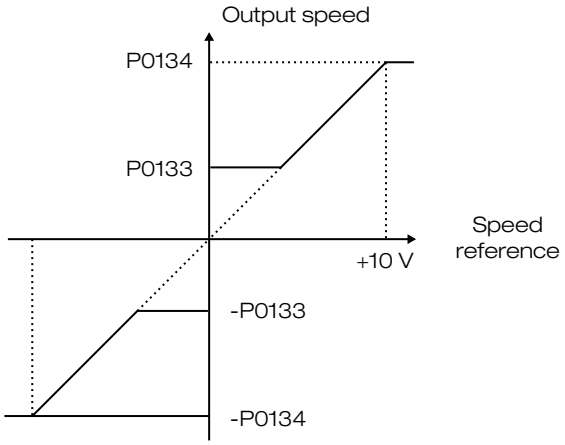
- When the actual speed exceeds the value of P0134 + P0132 for over 20 ms, the MVW01 will disable the PWM pulses and indicate fault F0112 (Motor Over Speed).
- The setting of P0132 is a percentage value of P0134.
- When setting P0132 = 100 % the function will be disabled.

NOTE!
This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0133 - Minimum speed reference			
P0134 - Maximum speed reference			
Adjustable range:	0 to 7200 rpm	Factory setting:	P0133 = 90 rpm P0134 = 1800 rpm

Description:

- It defines the maximum/minimum values of speed reference for the motor when the inverter is enabled. Valid for any type of reference signal.
- For details on the actuation of P0133 see P0233 (Dead Zone).



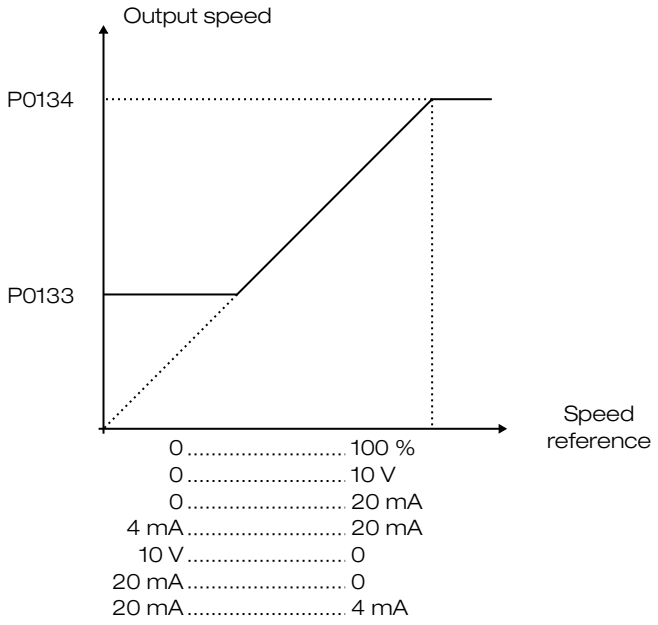


Figure 5.6: *Speed limits considering active dead zone (P0233 = 1)*

P0136 - Manual torque boost (I x R)			
Adjustable range:	0 to 100	Factory setting:	0

Description:

- It compensates the voltage drop in the motor stator resistance.
- It actuates at low speeds, increasing the inverter output voltage in order to keep the torque constant at V/f operation.
- The optimal setting is the smallest value of P0136 that allows the satisfactory motor start.
- Value above the necessary will increment in excess the motor current at low speeds, which may force the inverter in an overcurrent condition (F0070, F0071 and F0072).
- The maximum value of increase for the output voltage is equal to 20 % of the rated voltage, in null frequency, when P0136 = 100.
- Setting 0 means inactive function.

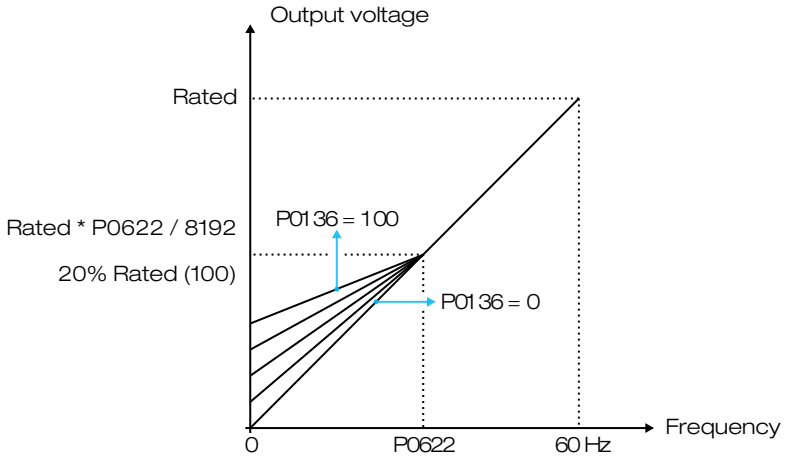


Figure 5.7: *P0202 = 0, V/f curve 60 Hz*

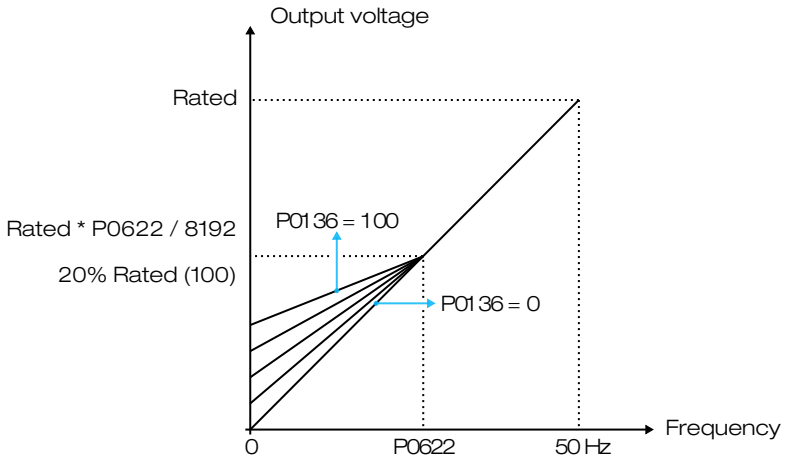


Figure 5.8: *P0202 = 1, V/f curve 50 Hz*

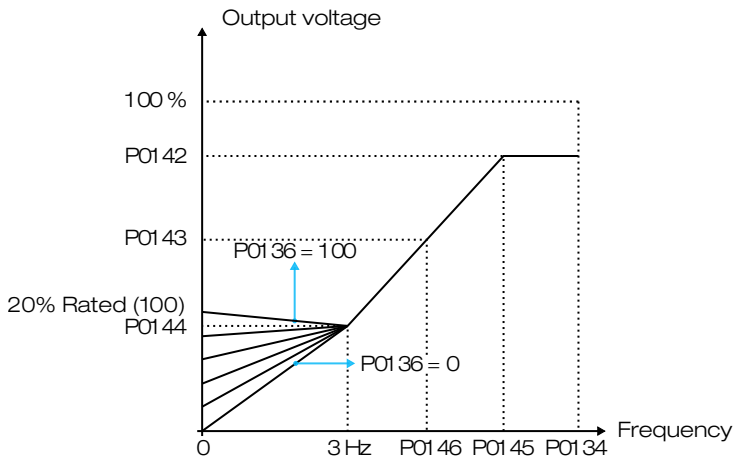


Figure 5.9: *P0202 = 2, V/f adjustable curve*

NOTE!
This parameter is only visible on the HMI when: the control type is scalar, P0202 = 0, 1 or 2 (V/f control).

P0137 - Automatic torque boost			
Adjustable range:	0 to 1000	Factory setting:	0

Description:

- Addition on the automatic torque curve compensates the voltage drop in the stator resistance as a function of the motor active current.
- The criteria for the setting of P0137 are the same as those of parameter P0136.

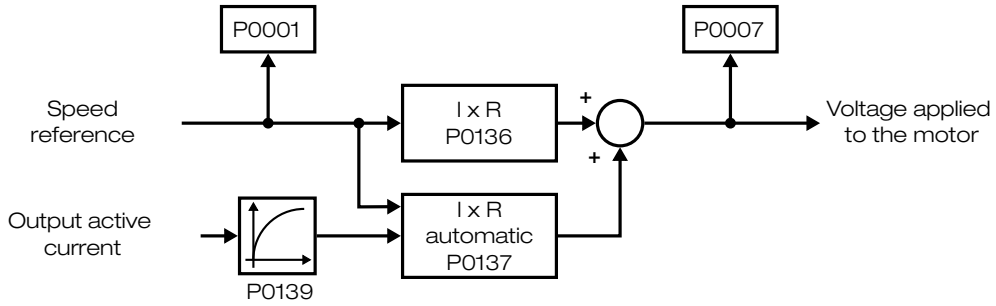


Figure 5.10: *Block diagram of P0137*

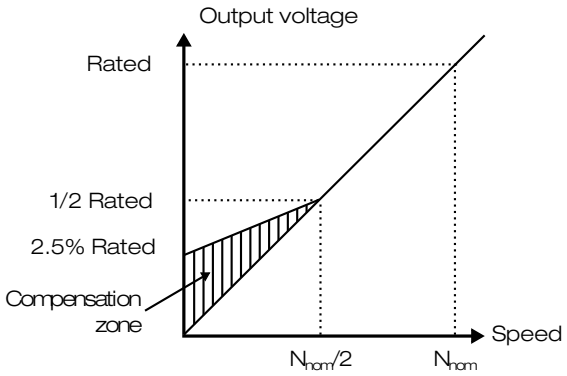


Figure 5.11: *V/f curve with automatic torque boost*

NOTE!
This parameter is only visible on the HMI when: the control type is scalar, P0202 = 0 (V/F 60 Hz) or P0202 = 1 (V/F 50 Hz).

P0138 - Rated Slip			
Adjustable range:	-10.00 to 10.00 %	Factory setting:	0.00 %

Description: Scalar mode:

- Parameter P0138 (for speeds between -10.00 % and +10.00 %) is used in the motor Slip Compensation function. It compensates the motor speed drop due to the application of load. It increments the output frequency as a function of the increase in the motor active current.
- P0138 allows the user to set precisely the slip compensation on the MVW01. Once P0138 is set, the inverter will keep the speed constant even with load variations by means of the automatic setting of voltage and frequency.

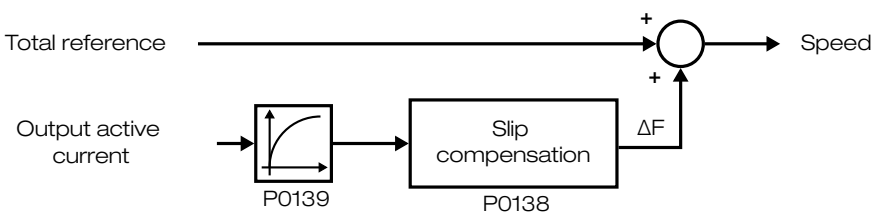


Figure 5.12: *Block diagram P0138 (scalar)*

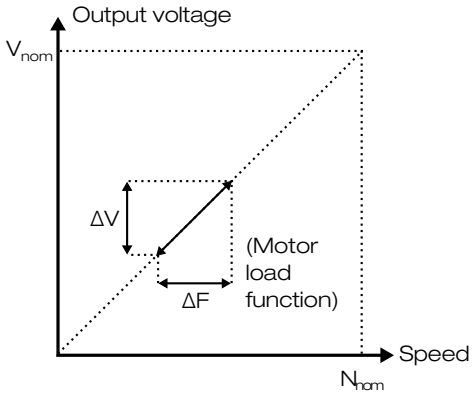


Figure 5.13: *V/f curve with slip compensation*

P0138 adjustment procedure:

1. Drive motor with no load, at approximately half the use speed range.
2. Measure the motor or equipment speed.
3. Apply rated load to the equipment.
4. Increment parameter P0138 until the speed reaches the value with no load.

- Values P0138 < 0.0 are used in special applications to reduce the output speed as a function of the increase in the motor current. Ex.: load distribution on motors driven in parallel.

Vector Mode (Droop Control):

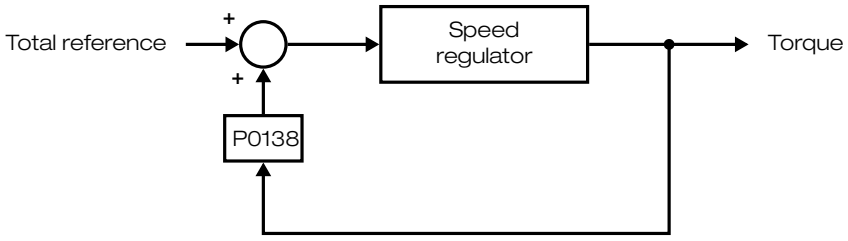


Figure 5.14: *Block diagram P0138 (vector)*

- In the vector mode (encoder or sensorless) parameter P0138 has the function described in Figure 5.13 on page 5-23.
- A value proportional to the motor load is added to the total speed reference is added.
- This parameter is used in the multimotor application.

P0139 - Output current filter			
Adjustable range:	0.0 to 16.0 s	Factory setting:	0.2 s

Description:

- It sets the time constant of the active current filter.
- It sets the response time of the slip compensation and automatic torque boost.
- See Figure 5.10 on page 5-22 and Figure 5.12 on page 5-22.

P0140 - Redundant ventilation select.			
Adjustable range:	0 to 4	Factory setting:	0

Description:

- It selects the active ventilation set and the redundant ventilation operation mode.
- With P0140 = Inactive, the redundant ventilation function is deactivated and all the software internal records and timers are reset.
- With P0140 programmed for Set A or Set B, the redundant ventilation function operates with just one set of fans. The periodical set alternation must be done manually by changing P0140 between 1 and 2. In this operating mode, an automatic test of the second set is carried out after the time set in P0141 has elapsed.
- With P0140 programmed for Alternating A or Alternating B, the redundant ventilation function starts the operation of the selected set and begins alternating automatically between the two sets, according to the time programmed in P0141.
- The current status of the redundant ventilation function can be viewed in P0041.
- For redundant ventilation function operates properly, it is necessary to program a digital output (DO1 to DO2, or RL1 to RL5) for the selection of the active set, and two digital inputs (DI1 to DI10) for set A and set B operation failure.
- A ventilation failure alarm is activated when one of the sets fails (alarm A0094 or A0114 for set A or set B, respectively).
- The Redundant Ventilation function is only possible with the proper hardware installed (refer to the supplier specific project).

Table 5.13: *Redundant ventilation select.*

P0140	Function
0	Off
1	Group A
2	Group B
3	Alternate A
4	Alternate B

P0141 - No of hours for alternating vent.set			
Adjustable range:	1 to 9999 h	Factory setting:	720 h

Description:

- It defines the number of hours between the change of the ventilation set.

NOTE!
This parameter is only visible on the HMI when the redundant ventilation function is actived, P0140 > 0.

P0142 - Maximum Voltage P0143 - Intermediate output voltage P0144 - Output voltage at 3 Hz P0145 - Field weakening speed P0146 - Intermediate speed			
Adjustable range:	P0142 = 0.0 to 150.0 % P0143 = 0.0 to 100.0 % P0144 = 0.0 to 100.0 % P0145 = 0 to 7200 rpm P0146 = 90 to 7200 rpm	Factory setting:	P0142 = 100.0 % P0143 = 50.0 % P0144 = 8.0 % P0145 = 1800 rpm P0146 = 900 rpm

Description:

- It allows changing the standard V/f curves defined in P0202. It may be used to obtain approximately quadratic V/f curves or on motors with voltages/frequencies different from the conventional standards.
- This function allows changing the defined standard characteristic curves, which relate the inverter output voltage and frequency and consequently the motor magnetization flux. This characteristic can be used in special applications in which the motors need rated voltage or rated frequency different from the standards.
- Function activated with P0202 = 2 (V/F Adjust).
- The standard value of P0144 (8.0 %) is defined for standard motors 60 Hz. In case the motor rated frequency (set in P0403) is different from 60 Hz, the standard value of P0144 may become inadequate, and it may cause problems in the motor start.

If it is necessary to increase the starting torque, increase the value of P0144 gradually.

- Procedure to parameterize the “Adjustable V/f” function:

1. Disable the inverter.
2. Check the inverter data (P0295 and P0296).
3. Set the motor data (P0400 to P0406).
4. Set the data for indication of P0001 and P0002 (P0208).
5. Set the speed limits (P0133 and P0134).
6. Set the parameters of the adjustable V/f function (P0142 to P0146).
7. Enable the adjustable V/f function (P0202 = 2).

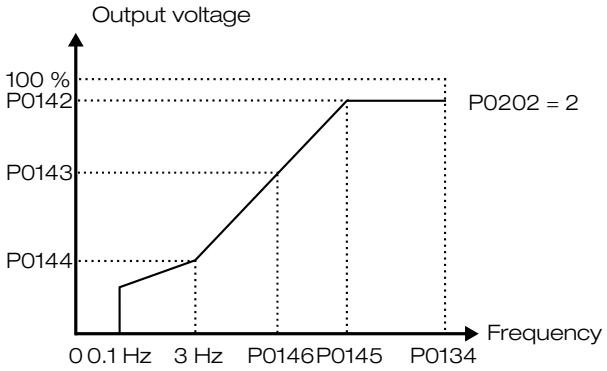


Figure 5.15: *Adjustable V/f curve*

NOTE!

- This parameter can be changed only with the motor stopped.
- This parameter is only visible on the HMI when: the control type is adjustable scalar, P0202 = 2 (V/F Adjust).

P0150 - DC link voltage regulation mode			
Adjustable range:	0 to 2	Factory setting:	0

Description:

- DC link voltage regulation mode.
- It configures the voltage regulation mode on the DC link.

Without losses:
Deceleration ramp control equal to the scalar mode. Setting in P0151.

Without losses, automatic:
Automatic deceleration ramp control. The Optimal Braking is inactive. The deceleration ram is automatically set to keep the DC link below the level set in P0151. This procedure avoids overvoltage on the DC link. I can also be used with eccentric loads.

With losses, automatic:
The Optimal Breaking is active as described in P0151 for vector control. That gives the smallest deceleration time possible. Maximum rotor flux set in P0179.

Table 5.14: *DC link voltage regulation mode*

P0150	Function
0	w/o losses
1	w/o I.Auto
2	w. I.Auto

NOTE!

- This parameter can be changed only with the motor stopped.
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0151 - DC Link voltage regulation level			
Adjustable range:	325 to 7350 V	Factory setting:	6458 V

Description: **Scalar mode (P0202 = 0, 1 or 2):**

- P0151 sets the voltage regulation level of the DC link to prevent overvoltage. This parameter, together with P0152, allows two operation types to regulate the DC link voltage.

Regulation type of the DC link when P0152 = 0.00 and P0151 different from the maximum value:

Ramp holding - When the voltage of the DC link reaches the regulation level during deceleration, the deceleration ramp time is extended and the speed is maintained at a constant value until the DC link voltage leaves the actuation level. See Figure 5.16 on page 5-26. This voltage regulation of the DC link (ramp holding) tries to avoid the locking of the inverter due to errors related to overvoltage on the DC link when the deceleration occurs with high inertia loads or with short deceleration times.

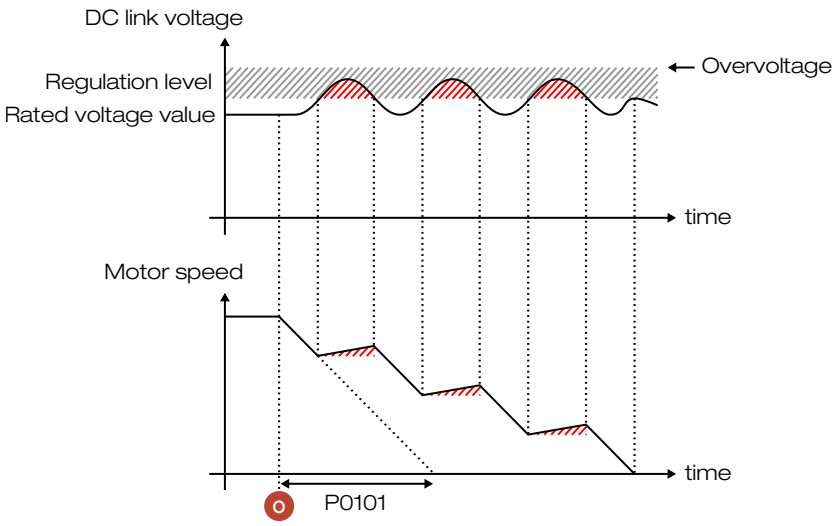


Figure 5.16: *Deceleration with ramp holding*

- With this function, an optimized (minimum) deceleration time is obtained for the driven load.
- This function is useful in medium inertia applications that require short deceleration ramps.
- In case the supply line is permanently with overvoltage (DC link voltag > P0151), the inverter may not decelerate. In this case, reduce the line voltage or increment P0151.

Regulation type of the DC link voltage when P0152 > 0.00 and P0151 different from the maximum value:

When the DC link voltage reaches the regulation level during deceleration, the deceleration time is extended and the motor is accelerate until the DC link leaves the actuation level. See Figure 5.16 on page 5-26 and Figure 5.17 on page 5-27 .

Table 5.15: *Recommended DC link voltage regulation levels*

Inverter V_{nom}	P0151
220/230 V	375 V
380 V	618 V
2300 V	3571 V
3300 V	5123 V
4160 V	6428 V
4600 V	7107 V
6900 V	6000 V

For inverters of rated voltage of 6000 V, 6300 V and 6600 V it must be parameterized P0296 = 5; however, for those values of rated voltage, P0151 must be manually set to:
6000 V - 5220 V
6300 V - 5480 V
6600 V - 5740 V

NOTE!
In case locking for overvoltage still occurs during deceleration, the valu of parameter P0152 must be gradually increased or the deceleration ramp time (P0101 and/or P0103) must be increased. In case the line is permanently with overvoltage (DC link voltage > P0151) the inverter may not decelerate. Reduce the line voltage or increment P0151.

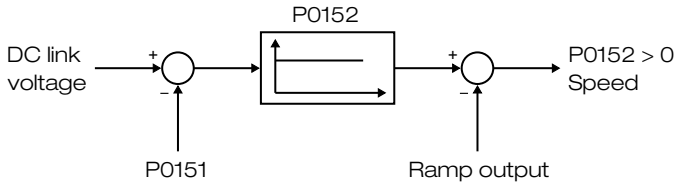


Figure 5.17: *Block diagram of the DC link voltage regulation*

Vector Mode (P0202 = 3 or 4):

- P0151 defines the DC link regulation level during braking. During the braking process, the deceleration ramp time is automatically extended, thus avoiding an overvoltage fault.

- The DC link voltage regulation operation can be set in two forms:
  1. With losses (Optimal Braking) - P0150 = 2. In this mode the rotoric flux current is applied in a manner that increases the losses in the motor, thus increasing the braking torque.
  2. Without losses - Set P0150 = 1. It only activates the DC link voltage regulation.

P0152 - Proportional gain of the regulator			
Adjustable range:	0.00 to 9.99	Factory setting:	0.00

Description:

- Refer to P0151 (with V/f control) and Figure 5.17 on page 5-27.
- If P0152 = 0.00 and P0151 different from the maximum value, the ramp holding function is active. Refer to P0151 for V/f.
- P0152 multiplies the voltage error of the DC link, that is, error = present DC link-P0151. P0152 is typically used to prevent overvoltage in applications with eccentric loads.

P0153 - Dyn Brake Level			
Adjustable range:	325 to 7350 V	Factory setting:	6458 V

Description:

- Dynamic braking can be used only if a braking resistor is connected to the MVW01. The braking transistor operation voltage level must be set according to the supply line voltage. If P0153 is adjusted at a level too close to the overvoltage (F0022) trip level, then the fault may occur before the braking transistor and resistor are able to dissipate the regenerated energy.
- Consulte a Table 5.16 on page 5-28 e a Figure 5.18 on page 5-28.

Table 5.16: *Recommended adjustment*

Inverter V_{nom}	P0296	P0153	F0022
220/230 V	0	375 V	>420 V
380 V	1	618 V	>734 V
2300 V	2	3571 V	>4064 V
3300 V	3	5123 V	>5830 V
4160 V	4	6428 V	>7350 V
4600 V	5	7107 V	>8200 V

- The MVW01-5L line does not offer the dynamic braking option.

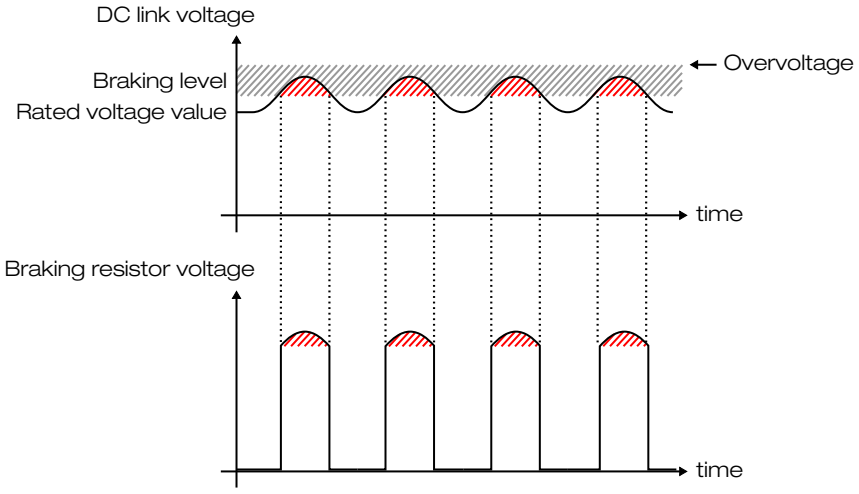


Figure 5.18: *Dynamic Braking operation curve*

- To actuate the dynamic braking, install the dynamic braking resistor and adjust P0154 and P0155 values according to the used braking resistor.

P0154 - DB Resistor Ohms			
Adjustable range:	0.0 to 500.0 Ω	Factory setting:	0.0 Ω

Description:

- Set with value equal to the ohmic resistance of the braking resistor used.
- P0154 = 0 disables the braking resistor overload protection. It must be programmed with “0” when no braking resistor is used.

P0155 - Resistor rated power			
Adjustable range:	10 to 1500 kW	Factory setting:	50 kW

Description:

- It adjusts the overload protection for the dynamic braking resistor.
- Set according to the rated power of the braking resistor used.
- Operation: if the average power on the braking resistor is higher than the value set at P0155 during 2 minutes, the inverter trips with F0077 (Breaking Resist. Overload).
- Refer to the dynamic braking in the specific project.

P0156 - Overload current at 100 %			
P0157 - Overload current at 50 %			
P0158 - Overload current at 5 %			
Adjustable range:	0.0 to 3420.0 A	Factory setting:	P0156 = 330.0 A P0157 = 270.0 A P0158 = 150.0 A

Description:

- It is for the motor and inverter overload protection.
- The motor overload current is the value above which the inverter considers that the motor is operating under overload. The higher the difference between the motor current and the overload level, the sooner the fault occurs.
- Parameter P0156 Motor Overload Current at Rated Speed) must be adjusted 10 % higher than the used motor rated current (P0401).
- The overload current is obtained as a function of the speed being applied to the motor, according to the overload curve.
- Parameters P0156, P0157 and P0158 are the three points used to form the motor overload curve, as shown in Figure 5.20 on page 5-30 for the factory setting.
- With the overload current curve adjustment it is possible to program an overload value that varies according to the inverter operation speed (factory default), improving the protection for self-ventilated motors, or to use a constant overload level for any speed applied to the motor (motor with separated ventilation).

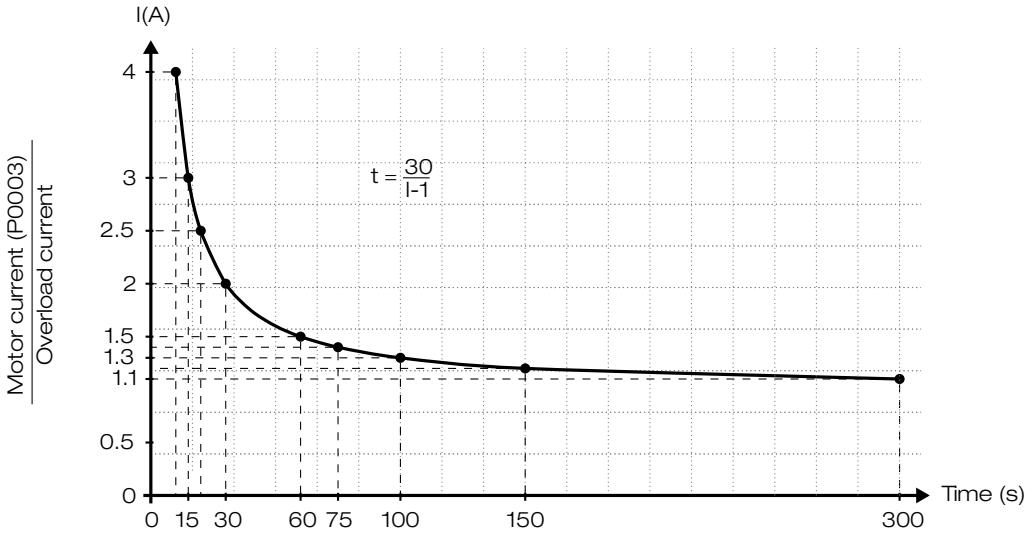


Figure 5.19: *Function I x t - overload detection*

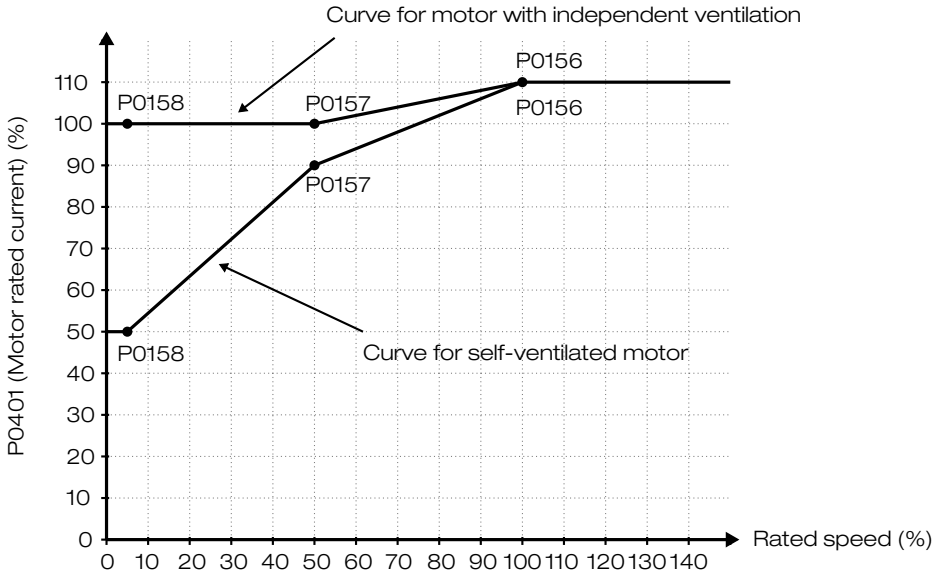


Figure 5.20: *Overload protection levels*

NOTE!
When P0295 or P0401 are changed, the values of P0156 to P0158 are changed according to the new current:
P0156 = 1.10 × (P0295 or P0401)
P0157 = 0.90 × (P0295 or P0401)
P0158 = 0.50 × (P0295 or P0401)

P0159 - Temperature alarm I x t			
Adjustable range:	0 to 100 %	Factory setting:	80 %

Description:

- When the value of P0076 reaches the value given in this parameter, alarm A0046 (I x t Alarm) is indicated on the HMI.

P0161 - Speed regulator proportional gain			
P0162 - Integration constant of the speed reg.			
Adjustable range:	P0161 = 0.0 to 200.0 P0162 = 1 to 9999	Factory setting:	P0161 = 20.0 P0162 = 100

Description:

- Gains set as a function of parameter P0413 (Tm Constant).
- These gains can also be manually adjusted to optimize the speed dynamic response. Increase those gains in order to obtain a faster response. If the speed starts oscillating, reduce the gains.
- See Figure 5.27 on page 5-46.

NOTE!
This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0165 - Speed Filter			
Adjustable range:	0.001 to 1.000 s	Factory setting:	0.012 s

Description:

- It sets the time constant for the speed filter.
- See Figure 5.27 on page 5-46.

NOTE!
This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0167 - Current regulator proportional gain			
P0168 - Current regulator Integral gain			
Adjustable range:	P0167 = 0.000 to 9.999 P0168 = 0.1 to 999.9	Factory setting:	P0167 = 0.080 P0168 = 12.3

Description:

- P0167 and P0168 set as a function of parameters P0411 and P0409 respectively.

NOTE!
This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0169 - Maximum out current			
Adjustable range:	0.0 to 3705.0 A	Factory setting:	346.5 A

Description:

- It is intended to avoid the motor stalling (locking) during overloads. If the load on the motor increases, its current will increase.
- If the current exceeds the value set in P0169, the motor speed will be reduced following the deceleration ramp until the current is below the value set in P0169. When the overload disappears, the speed goes back to the normal value.

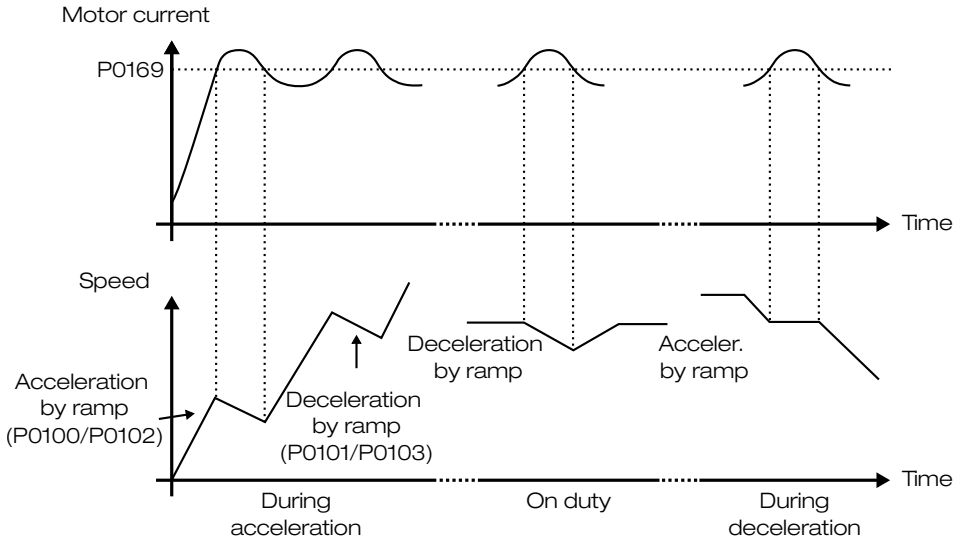


Figure 5.21: *Curves showing the current limitation actuation*

NOTE!
This parameter is only visible on the HMI when: the control type is scalar, P0202 = 0, 1 or 2 (V/f control).

P0170 - Maximum reverse torque current			
P0171 - Maximum current of forward torque			
Adjustable range:	0 to 250 %	Factory setting:	105 %

Description:

- It limits the value of the motor current component that produce torque. The adjustment is expressed in percentage of the inverter rated current (value of parameter P0295).
- During the current limitation process, the motor current can be calculated by:

$$I_{motor} = \sqrt{(P0170 \text{ or } P0171)^2 + (P0410)^2}$$

- During the optimal braking, P0171 acts as the limitation of the maximum output current to generate the forward braking torque (refer to P0151).
- Although the value of P0170 and P0171 depends on the relation between P0295 and P0401, its value is limited to 250 %.

NOTE!
This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0175 - Flux regulator proportional gain			
P0176 - Integration constant of the flux regulat.			
Adjustable range:	P0175 = 0.0 to 999.9 P0176 = 1 to 9999	Factory setting:	P0175 = 50.0 P0176 = 900

Description:

- Gains set as a function of parameter P0412.
- See Figure 5.27 on page 5-46.

NOTE!
This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0177 - Minimum flux on the motor			
P0178 - Rated flux on the motor			
P0179 - Maximum flux on the motor			
Adjustable range:	P0177 = 0 to 120 % P0178 = 0 to 120 % P0179 = 0 to 200 %	Factory setting:	P0177 = 0 % P0178 = 100 % P0179 = 120 %

Description:

- Flux conditions on the motor.
- See Figure 5.27 on page 5-46.

NOTE!
This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0180 - Starting point of the field weakening			
Adjustable range:	0 to 120 %	Factory setting:	85 %

Description:

- It expresses the percentage of the modulation index from which the motor field weakening occurs.

P0181 - Magnetization mode			
Adjustable range:	0 to 1	Factory setting:	0

Description:

- It configures the magnetization mode of the machine to be driven.

Table 5.17: *Magnetization mode*

P0181	Function
0	Gen Enable
1	Run/Stop

NOTE!
This parameter can be changed only with the motor stopped.

P0182 - Flux ref. regulator proportional gain			
P0183 - Flux ref. regulator integral gain			
Adjustable range:	P0182 = 0.00 to 99.99 P0183 = 1 to 9999	Factory setting:	P0182 = 0.20 P0183 = 25

Description:

- PI gains of the flux regulator.
- See Figure 5.27 on page 5-46 .

NOTE!
This parameter is only visible on the HMI when: P0950 = 3 (Permanent magnet synchronous motor).

P0202 - Control Type			
Adjustable range:	0 to 4	Factory setting:	0

Description:

- It defines the control type of the inverter.

Menu Autoguiado:

- When P0202 is programmed for sensorless vector (P0202 = 3) or vector with encoder (P0202 = 4), the inverter enters the guided start-up routine (refer to Figure 5.22 on page 5-34).
- In this mode, the user must adjust a series of motor parameters, so that the vector control operates properly.

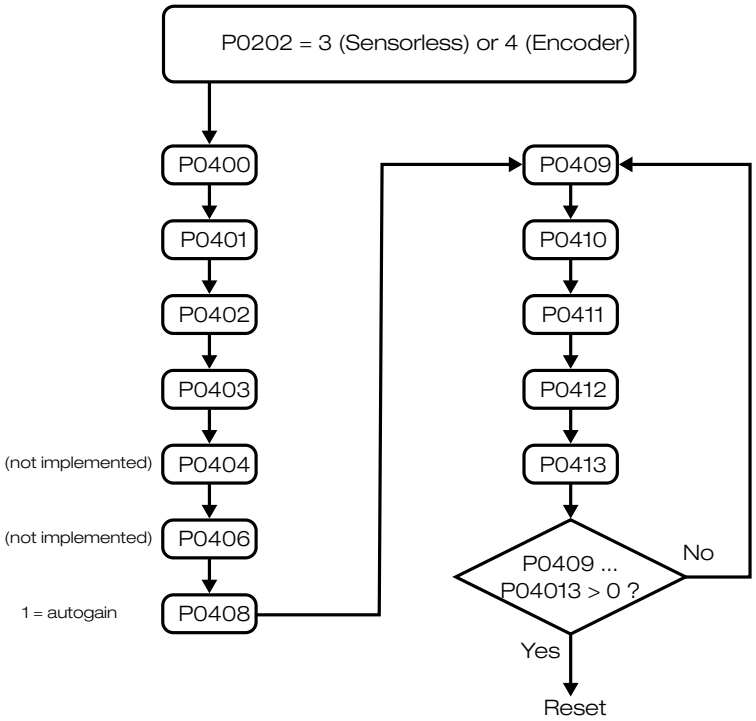


Figure 5.22: *Guided start-up routine sequence*

The Table 5.18 on page 5-35 shows the summarized description of each parameter:

Table 5.18: Guided start-up routine

Parameter	Description
P0400	Motor rated voltage
P0401	Motor rated current
P0402	Motor rated speed
P0403	Motor Rated Freq
P0404	Not implanted in this software version
P0406	Not implanted in this software version
P0408	Run Self-tuning 0 = Inactive 1 = Autogain (automatic calculation of the gains of the controllers)
P0409	Motor stator resistance Rs
P0410	Motor magnetization current (Imr)
P0411	Motor Flux Leakage Inductance
P0412	Lr/Rr Constant
P0413	Tm Time Constant

- Refer to the specific description of each parameter for more details.
- Parameters from P0409 to P0413 correspond to motor internal parameters, and they must be programmed according to the motor nameplate data.
- The values programmed at P0409 to P0413 must be different from zero; otherwise, the inverter will not leave the guided start-up routine.
- The configuration of this parameter must be done under the orientation of WEG technical assistance.

Table 5.19: Control Type

P0202	Function
0	V/F 60 Hz
1	V/F 50 Hz
2	V/F Adjust
3	Sensorless
4	Encoder

P0203 - Special function selection

Adjustable range: 0 to 3 Factory setting: 0

Description:

- It defines the special function selection.
- For the PID Reg. special function, refer to the detailed description of the related parameters (P0520 to P0535).
- When P0203 is changed to 1 or 3, P0265 is automatically changed to 15 - Man/Auto.

Table 5.20: Special function selection

P0203	Function
0	None
1	PID Reg.
2	Trace
3	Trace+PID

NOTE!
This parameter can be changed only with the motor stopped.

P0204 - Load/Save Parameters

Adjustable range:	0 to 5	Factory setting:	0

Description:

- P0204 (Load/Save Parameters)
- Option P0204 = 5 (Load WEG) is disabled when P0309 ≠ 0 (Fieldbus active).

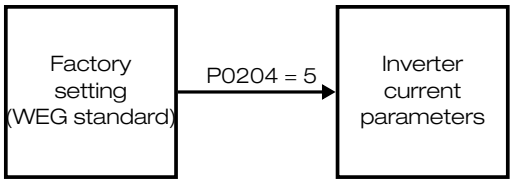


Figure 5.23: *Parameter transference*

5

Table 5.21: *Load/Save Parameters*

P0204	Function
0	Not Used
1	Reserved
2	Reserved
3	Reset P043
4	Reset P044
5	Load WEG

NOTE!
This parameter can be changed only with the motor stopped.

P0206 - Auto-Reset Time

Adjustable range:	0 to 255 s	Factory setting:	0 s

Description:

- In the event of a fault trip the inverter can initiate an automatic reset after the time given by P0206 has elapsed.
- If P0206 ≤ 2 auto-reset will not occur.
- After the auto-reset if the same fault is repeated three times consecutively, then the Auto-Reset function will be disable.
- A fault is considered consecutive if it happens again within 30 seconds after an auto-reset. Therefore, if an error occurs four consecutive times, it will be permanently indicated and the drive will be disabled (in such case a reset command becomes necessary. E.g.: HMI, DI, serial, etc).

P0208 - Reference scale factor

Adjustable range:	1 to 18000	Factory setting:	1800

Description:

- It defines how the Motor speed reference (P0001) and Motor Speed (P0002) will be presented when it runs at synchronous speed.
- To indicate the values in rpm:
  Set P0208 to the synchronous speed according to Table 5.22 on page 5-37 .

Table 5.22: Synchronous speed reference in rpm

Frequency	Number of motor poles	Synchronous Speed
50 Hz	2	3000
	4	1500
	6	1000
	8	750
60 Hz	2	3600
	4	1800
	6	1200
	8	900

- The value shown can be calculated through the formulas:

$$P0002 = \frac{speed \times P0208}{sync.\ speed}$$

$$P0001 = \frac{reference \times P0208}{sync.\ speed}$$

Being:
Speed = present speed in rpm.
Sync. speed = 120 x P0403 / poles.
Poles = 120 x P0403 / P0402, it may be equal to 2, 4, 6, 8 or 10.
Reference = speed reference in rpm.

P0209 - Motor phase loss detection

Adjustable range:	0 to 1	Factory setting:	0

Description:

- The Motor Phase Loss Detection trips indicating F0076 when the following conditions are simultaneously satisfied:

1. P0209 = On.
2. Enabled inverter.
3. Speed reference higher than 3 %.
4. $I_{max} > 1.125 \times I_{min}$.

Being:
I_{max} is the highest current of the three phases.
I_{min} is the lowest current of the three phases.

Table 5.23: Motor phase loss detection

P0209	Function
0	Off
1	On

NOTE!
This parameter can be changed only with the motor stopped.

P0211 - Disable by zero speed (Stop Logic)

Adjustable range:	0 to 1	Factory setting:	1

Description:

- When active it disables the inverter (general disable) when the speed reference and the actual speed become lower than the value adjusted in P0291 (Zero Speed Zone) and after the time adjusted in P0213 has elapsed.
- The inverter is enabled again when any of the conditions defined in P0212 is fulfilled.

Table 5.24: *Disable by zero speed (Stop Logic)*

P0211	Function
0	Off
1	On

P0212 - Condition for disab. output by zero speed

Adjustable range:	0 to 1	Factory setting:	0

Description:

- When the PID Regulator is active (P0203 = 1 or 3) and in automatic mode, besides the condition programmed in P0212, it is also necessary that the PID error (the difference between the setpoint and the process variable) be more than the value programmed in P0535, so that the inverter will be able to leave the zero speed disable.

Table 5.25: *Condition for disab. output by zero speed*

P0212	Function
0	Ref or Spd
1	Reference

P0213 - Time delay for zero speed disable

Adjustable range:	0 to 999 s	Factory setting:	0 s

Description:

- P0213 = 0: stop logic without timing.
- P0213 > 0: stop logic with timing. After the speed reference and the motor speed become lower than the value set in P0291, count of the time set in P0213 begins. When the time count reaches this value, the inverter will be disabled. When the time programmed at P213 has elapsed the inverter will be disabled. If during that time count any of the conditions for the disable by stop logic no longer exists, the time count is reset and the inverter will be enabled again.

P0214 - Line phase loss detection

Adjustable range:	0 to 1	Factory setting:	1

Description:

- Line phase loss detection.
- The parameter P0214, being active, controls the following faults and alarms:
  A0001: Mains Low Voltage.
  A0002: Mains High Voltage.
  F0003: Under Voltage / Phase Loss.
  F0004: Mains Over Voltage.
  F0006: Mains unbalance/ loss of phase.
- The phase-loss detector is enabled to act when:
  1. P0214 = On.

2. Inverter enabled.
3. Pre-charge completed.
4. No Ride-through.

Table 5.26: Line phase loss detection

P0214	Function
0	Off
1	On

NOTE!
This parameter can be changed only with the motor stopped.

P0220 - LOCAL/REMOTE selection source

Adjustable range: 0 to 12 Factory setting: 11

Description:

- It defines the origin of the command that will select between the Local situation and the Remote situation.

Table 5.27: LOCAL/REMOTE selection source

P0220	Function
0	Always LOC
1	Always REM
2	Service HMI (LOC)
3	Service HMI (REM)
4	Digital Inputs DI2...DI10
5	Serial (LOC)
6	Serial (REM)
7	Fieldbus (LOC)
8	Fieldbus (REM)
9	PLC (LOC)
10	PLC (REM)
11	HMI (LOC)
12	HMI (REM)

NOTE!
This parameter can be changed only with the motor stopped.

P0221 - Speed reference selection LOCAL situation

P0222 - Speed reference selection REMOTE situation

Adjustable range: 0 to 13 Factory setting: P0221 = 13
P0222 = 0

Description:

- The AIx' designation refers to the analog signal obtained after the addition of AIx to the OFFSET multiplied by the applied gain.
- See Figure 5.30 on page 5-49 .
- The factory default for the Local speed reference is via HMI keys and and for Remote speed reference is via Analog Input AI1.

- The reference value adjusted with the ▲ and ▼ keys is contained in parameter P0121.
- Check the operation of the Electronic Potentiometer (P.E.) in Figure 5.37 on page 5-62.
- When selecting option 7 (P.E.), set P0265 or P0267 to 5 and P0266 or P0268 to 5.
- When selecting option 8, set P0266 and/or P0267 and/or P0268 to 7.

Table 5.28: *Speed reference selection REMOTE situation*

P0222	Function
0	Service HMI
1	Analog input AI1
2	Analog input AI2
3	Analog input AI3
4	Analog input AI4
5	Sum (AI1 + AI2) > 0
6	Sum (AI1 + AI2)
7	Electronic potentiometer
8	Multispeed
9	Serial
10	Fieldbus
11	Analog input AI5
12	PLC
13	HMI

NOTE!
This parameter can be changed only with the motor stopped.

P0223 - Forward/Reverse Selection LOCAL Situation

Adjustable range: 0 to 13 Factory setting: 12

Description:

- It defines the origin of the forward/reverse command and the direction used in LOCAL situation.

Table 5.29: *Forward/Reverse Selection LOCAL Situation*

P0223	Function
0	Always forward
1	Always reverse
2	Service HMI (Forward)
3	Service HMI (Reverse)
4	Digital Input DI2
5	Serial (Forward)
6	Serial (Reverse)
7	Fieldbus (Forward)
8	Fieldbus (Reverse)
9	AI4 Polarity
10	PLC (Forward)
11	PLC (Reverse)
12	HMI (Forward)
13	HMI (Reverse)

NOTE!
This parameter can be changed only with the motor stopped.

P0224 - Start/Stop Selection LOCAL Situation

Adjustable range: 0 to 5 Factory setting: 5

Description:

- It defines the origin of the Start/Stop command in the LOCAL situation.
- When the DIx inputs have the FORWARD/REVERSE function, the HMI keys I and O will remain inactive regardless of the value set in P0224 (Start/Stop Selection LOCAL Situation).

Table 5.30: *Start/Stop Selection LOCAL Situation*

P0224	Function
0	Service HMI
1	Digital input DIx
2	Serial
3	Fieldbus
4	PLC
5	HMI

NOTE!
This parameter can be changed only with the motor stopped.

P0225 - Selection of JOG Source LOCAL Situation

Adjustable range: 0 to 6 Factory setting: 6

Description:

- It defines the origin of the JOG command in the LOCAL situation.
- The speed reference value for JOG is provided by parameter P0122 (Speed reference for JOG or JOG+).

Table 5.31: *Selection of JOG Source LOCAL Situation*

P0225	Function
0	Disable
1	Service HMI
2	Digital inputs DI3 to DI10
3	Serial
4	Fieldbus
5	PLC
6	HMI

NOTE!
This parameter can be changed only with the motor stopped.

P0226 - Selection of Direction of ROTATION REMOTE Situation

Adjustable range: 0 to 13 Factory setting: 2

Description:

- It defines the origin of the forward/reverse command and the direction used in REMOTE situation.

Table 5.32: Selection of Direction of ROTATION REMOTE Situation

P0226	Function
0	Always forward
1	Always reverse
2	Service HMI (Forward)
3	Service HMI (Reverse)
4	Digital Input DI2
5	Serial (Forward)
6	Serial (Reverse)
7	Fieldbus (Forward)
8	Fieldbus (Reverse)
9	AI4 Polarity
10	PLC (Forward)
11	PLC (Reverse)
12	HMI (Forward)
13	HMI (Reverse)

NOTE!
This parameter can be changed only with the motor stopped.

P0227 - Start/Stop Selection REMOTE Situation

Adjustable range: 0 to 5 Factory setting: 0

Description:

- It defines the origin of the Start/Stop command in the REMOTE situation.
- When the DIx inputs have the FORWARD/REVERSE function, the HMI keys I and O will remain inactive regardless of the value set in P0227.

Table 5.33: Start/Stop Selection REMOTE Situation

P0227	Function
0	Service HMI
1	Digital input DIx
2	Serial
3	Fieldbus
4	PLC
5	HMI

NOTE!
This parameter can be changed only with the motor stopped.

P0228 - JOG Selection - REMOTE Situation

Adjustable range: 0 to 6 Factory setting: 1

Description:

- It defines the origin of the JOG command in the REMOTE situation.
- The speed reference value for JOG is provided by parameter P0122.

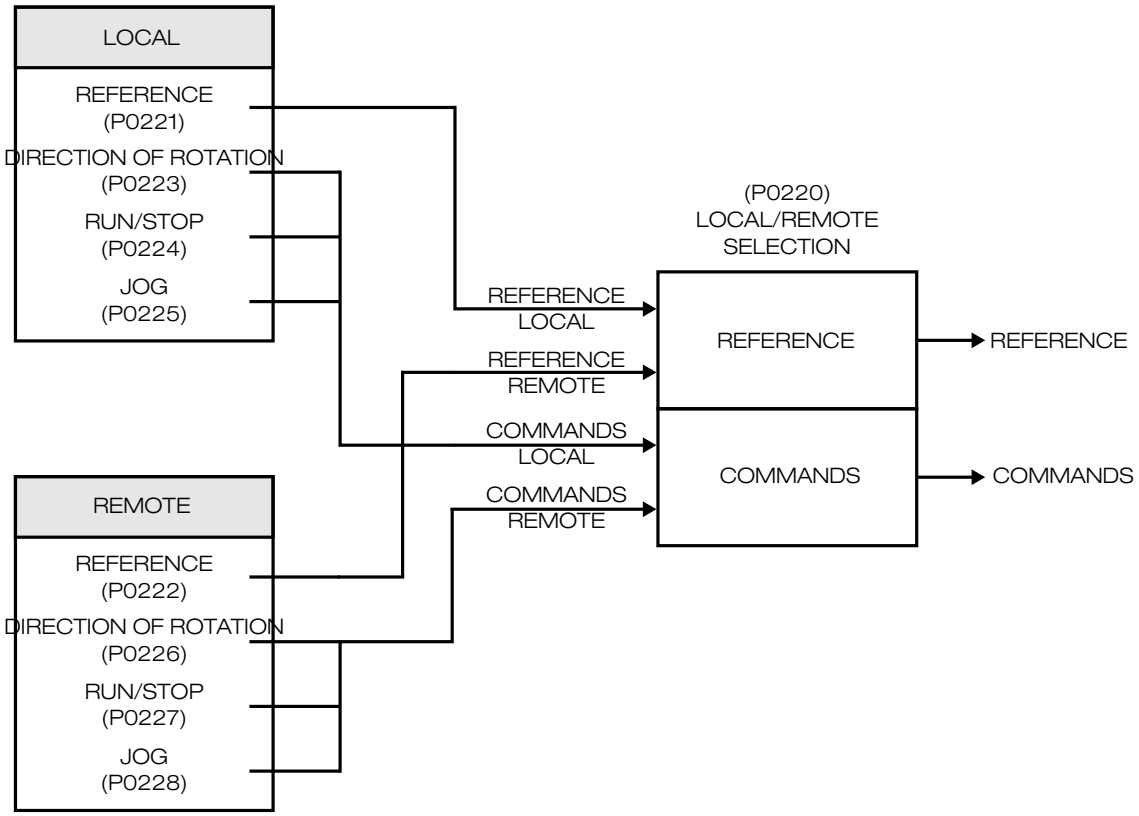


Figure 5.24: *LOCAL/REMOTE situation block diagram*

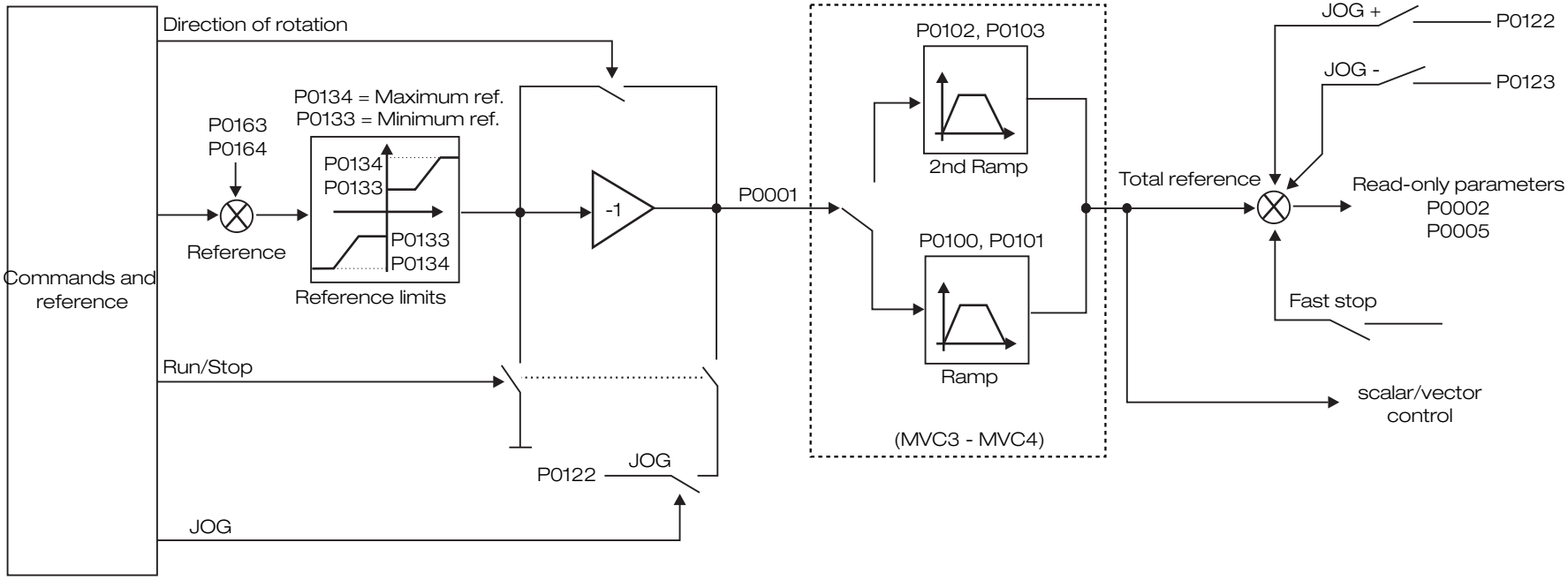


Figure 5.25: *Speed reference block diagram*

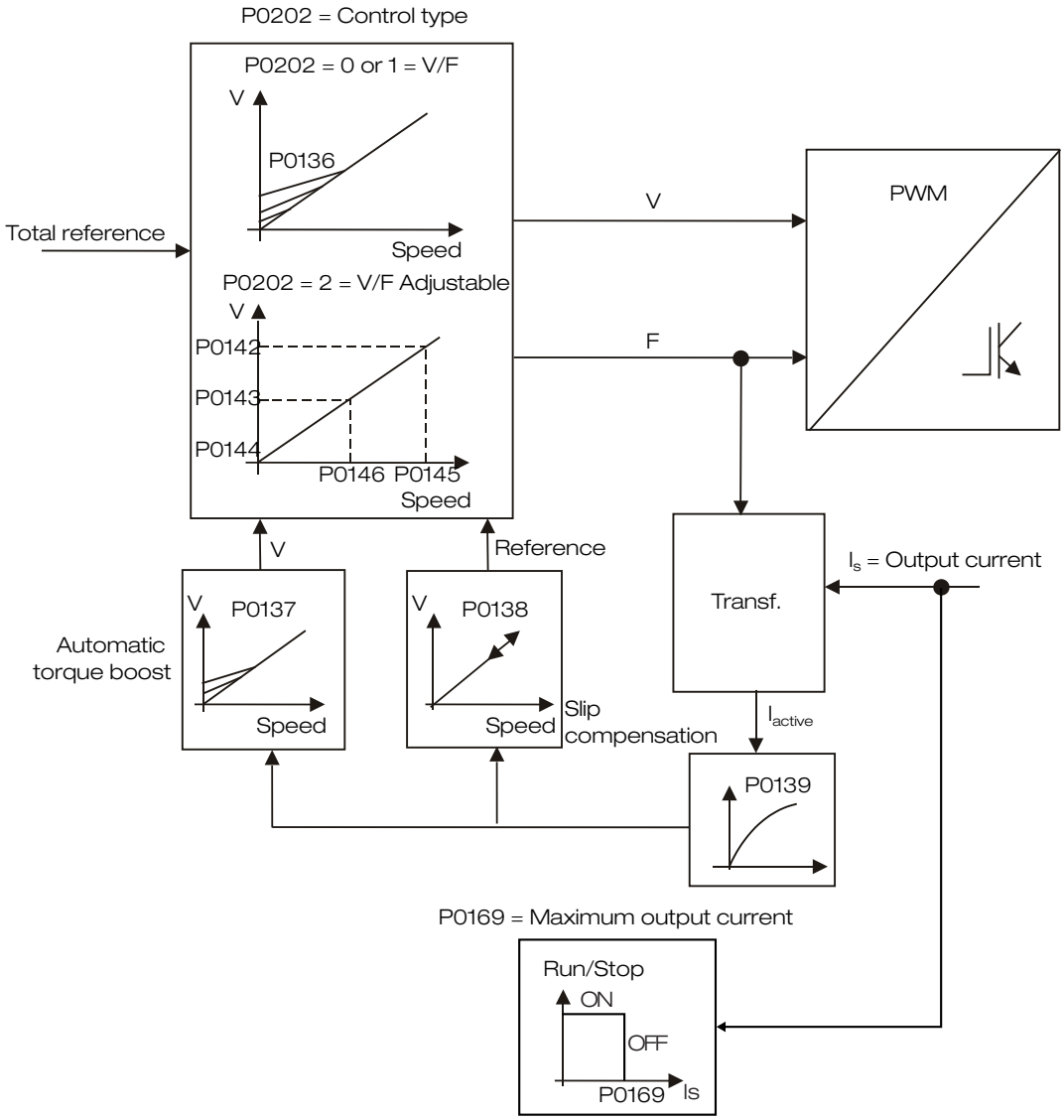


Figure 5.26: *Block diagram of scalar control with sinusoidal output filter*

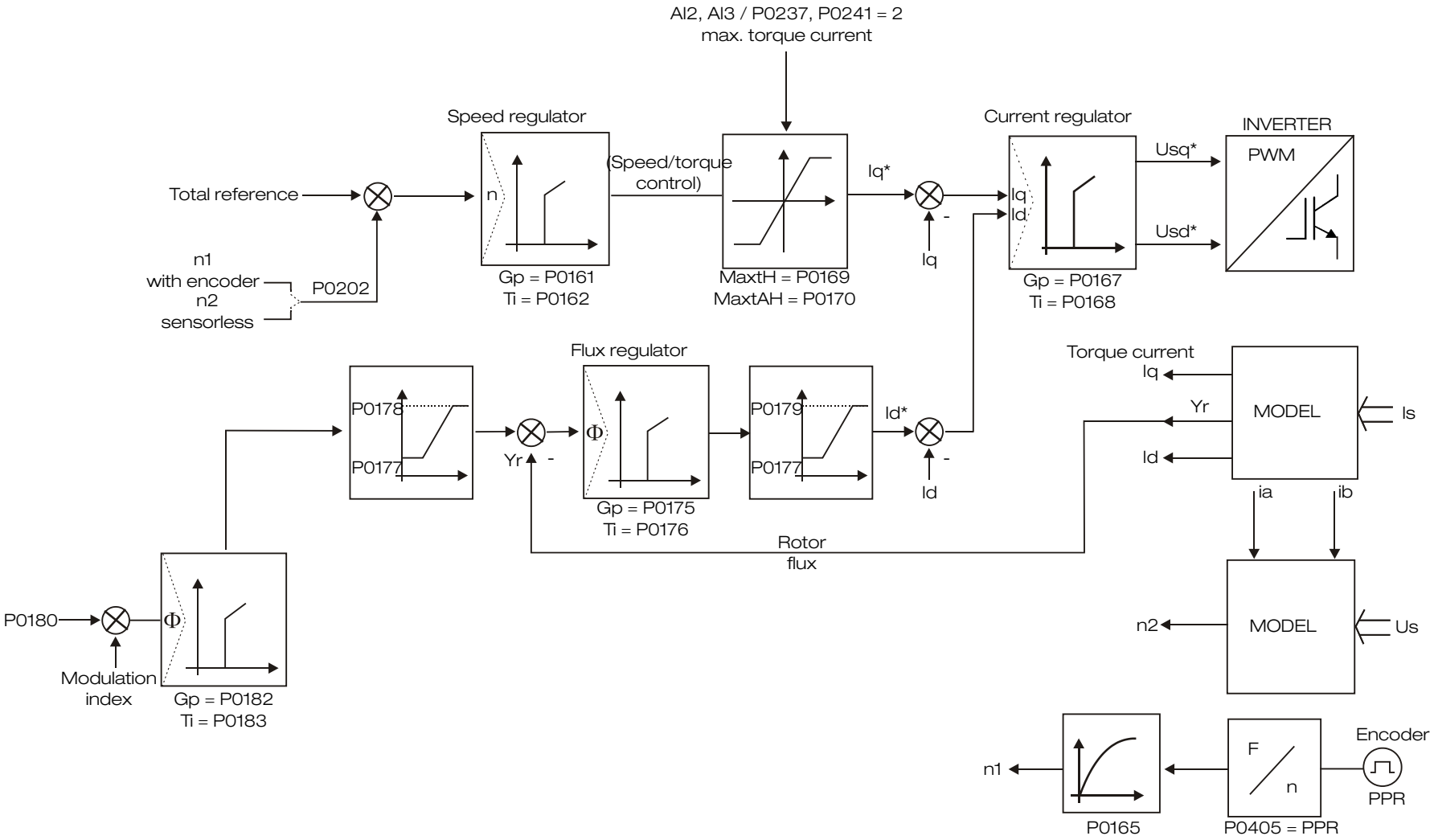


Figure 5.27: *Vector control block diagram*

Table 5.34: JOG Selection - REMOTE Situation

P0228	Function
0	Disable
1	Service HMI
2	Digital inputs DI3 to DI10
3	Serial
4	Fieldbus
5	PLC
6	HMI

NOTE!
This parameter can be changed only with the motor stopped.

P0231 - Transition between LOC/REM for the HMIG

Adjustable range: 0 to 2 Factory setting: 0

Description:

- P0231 defines the action to be taken by the inverter when the transition between LOCAL and REMOTE occurs for the Graphic HMI.
- This parameter only actuates when P0224 = 5 (HMI) or P0227 = 5 (HMI).

(*) In case the motor stops, it occurs according to the programming of P0232 (Stop Selection).

Table 5.35: Transition between LOC/REM for the HMIG

P0231	Function
0	Keep motor
1	Keep GHMI
2	Stop motor

P0232 - Stop Selection

Adjustable range: 0 to 1 Factory setting: 0

Description:

- With the P0232 setting, it is possible to select between the stop modes (Run/Stop and GenDisable) for the key or for the STOP function (via DIx).

NOTE!
When the “DISABLE GENERAL” stop mode is programmed, only drive the motor if it is stopped or set the necessary time for which the inverter is disabled (COAST) in P0725 to ensure the motor stop, or enable the Flystart function.

Table 5.36: Stop Selection

P0232	Function
0	Run/Stop
1	GenDisable

P0233 - Dead Zone			
Adjustable range:	0 to 1	Factory setting:	1

Description:

- It defines if the Dead Zone in the Analog Inputs is 0 = Off or 1 = On
- If P0233 = 0 (Off), the signal in the Analog Inputs acts on the Speed Reference from the minimum point:
  - (0 to 10) V/(0 to 20) mA/(4 to 20) mA:0 V/0 mA/4 mA.
  - (10 to 0) V/(20 to 0) mA/(20 to 4) mA:10 V/20 mA/20 mA.
- If P0233 = 1 (On), the signal in the Analog Inputs has a dead zone, where the Speed Reference remains at the value of the Minimum Value (P0133), even with the variation of the input signal.

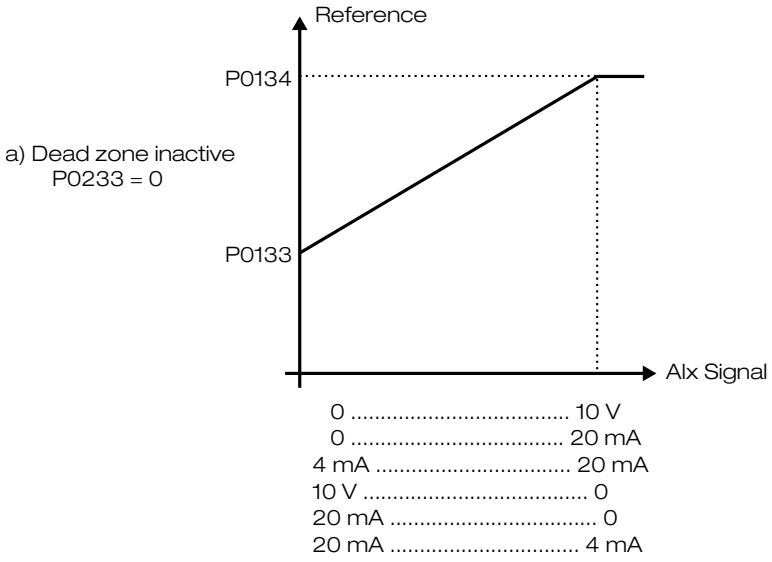


Figure 5.28: *Analog input dead zone inactive*

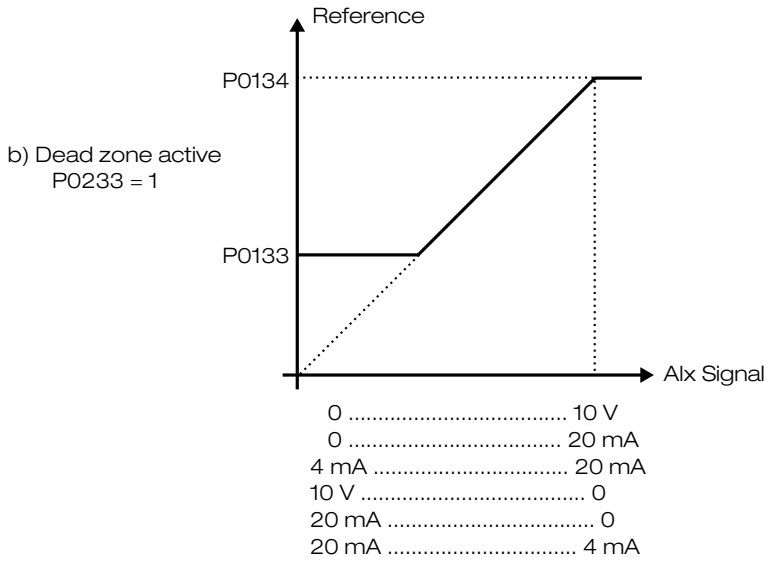


Figure 5.29: *Analog input dead zone active*

- If the analog input AI2 or AI4 is programmed for -10 to +10V (P0246 = 4), curves identical to those of the Figure 5.29 on page 5-48 only when AI2 or AI4 is negative will the direction of rotation be inverted.

Table 5.37: Dead Zone

P0233	Function
0	Off
1	On

P0234 - AI1 Gain

Adjustable range:	0.000 to 9.999	Factory setting:	1.000

Description: AI1' = -2 V, means the motor will spin in the opposite direction with a reference in module equal to 2 V.

- The internal values AI1', AI3', AI4' and AI5' are the result of the following equation:

$$AIx' = (AIx + \frac{OFFSET}{100} \times 10\ V) \times Gain$$

Example: AI1 = 5 V, OFFSET = -70 % and Gain = 1,00

$$AI1' = (5 + \frac{(-70)}{100} \times 10\ V) \times 1 = -2\ V$$

AI1' = -2 V, means the motor will spin in the opposite direction with a reference in module equal to 2 V.

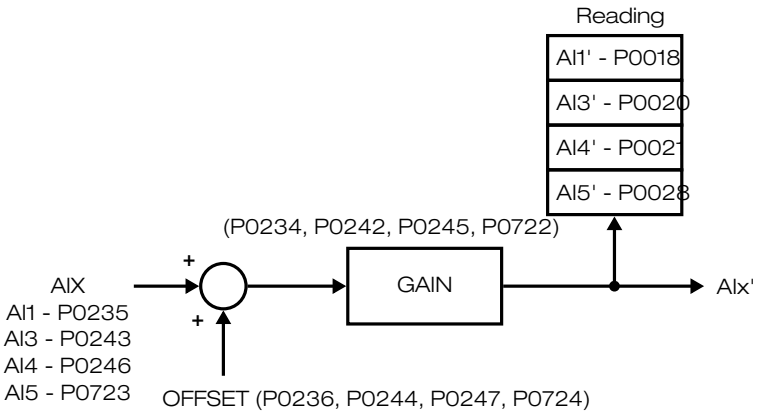


Figure 5.30: Block diagram of the analog inputs AI1, AI3, AI4 and AI5

P0235 - AI1 Signal Type

Adjustable range:	0 to 3	Factory setting:	0

Description:

- When current signals are used at AI1 input, put S2.A on the MVC4 control board in the "ON" position.
- For options 2 and 3 inverse reference is attained, that is, maximum speed is obtained with minimum reference.

Table 5.38: AI1 Signal Type

P0235	Function
0	0 to 10V / 0 to 20mA
1	4 to 20 mA
2	10 to 0V / 20 to 0mA
3	20 to 4 mA

NOTE!
This parameter can be changed only with the motor stopped.

P0236 - AI1 Offset			
Adjustable range:	-100.0 to 100.0 %	Factory setting:	0.0 %

Description:

- Refer to P0234.

P0237 - AI2 Signal Funct			
Adjustable range:	0 to 3	Factory setting:	0

Description:

- When the option 0 (P0221/P0222) is selected, AI2 is able to provide the reference (provided that programmed so in P0221/P0222), subject to the reference limits (P0133, P0134) and ramp action (P0100 to P0103).
- See Figure 5.25 on page 5-44 .
- Option 3 (Process Variable) defines the AI2 input as the PID regulator feedback signal (e.g., pressure or temperature sensor, etc.), provided that P0524 = 0.

Table 5.39: *AI2 Signal Funct*

P0237	Function
0	P221/P222
1	Not Used
2	Max.Tq.Cur
3	Proc. Var.

NOTE!
This parameter can be changed only with the motor stopped.

P0238 - AI2 Gain			
Adjustable range:	0.000 to 9.999	Factory setting:	1.000

Description:

- AI2' = -2 V, meaning that the motor will run in reverse direction with a speed reference absolute value equal to 2 V.
- The internal value of AI2' is the result of the following equation:

$$AI2' = (AI2 + \frac{OFFSET}{100} \times 10\ V) \times Gain$$

Example: AI2 = 5 V, OFFSET = -70 % and Gain = 1.00

$$AI2' = (5 + \frac{(-70)}{100} \times 10\ V) \times 1 = -2\ V$$

AI2' = -2 V, meaning that the motor will run in reverse direction with a speed reference absolute value equal to 2 V.

- AI2 has a variation range from -10 V to 10 V no matter if P0239 = 0 or 4, that is, an input voltage of 0 V corresponds in P0019 = 50 %. If it is necessary that 0 V correspond to P0019 = 0 %, the following setting must be done:

  P0238 = 2
  P0240 = -50 %

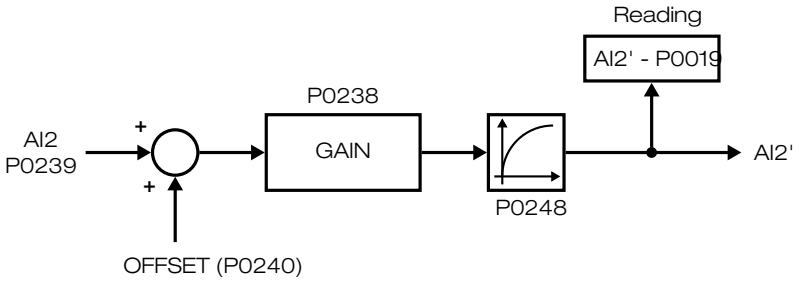


Figure 5.31: *Block diagram of analog input AI2*

P0239 - AI2 Signal Type			
Adjustable range:	0 to 4	Factory setting:	0

Description:

- When current signals are used at AI2 input, put S2.B on the MVC4 control board in “ON” position.
- For options 2 and 3 inverse reference is attained, that is, maximum speed is obtained with minimum reference.

Table 5.40: *AI2 Signal Type*

P0239	Function
0	0 to 10V / 0 to 20mA
1	4 to 20 mA
2	10 to 0V / 20 to 0mA
3	20 to 4 mA
4	-10 to +10V

NOTE!
This parameter can be changed only with the motor stopped.

P0240 - AI2 Offset			
Adjustable range:	-100.0 to 100.0 %	Factory setting:	0.0 %

Description:

- Refer to P0238.

P0241 - AI3 Signal Funct			
Adjustable range:	0 to 3	Factory setting:	0

Description:

- When the option 0 (P0221/P0222) is selected, AI3 is able to receive the speed reference, which will be subjected to the speed limits(P0133 and P0134) and ramp action (P0100 to P0103).
- Refer to Figure 5.25 on page 5-44 .
- The option 3, process variable, defines the AI3 input as the PID regulator feedback signal (e.g., pressure or temperature sensor, etc.), provided that P0524 = 1.

NOTE!
Isolated Analog Input located on the Optional Board EBB.

Table 5.41: AI3 Signal Funct

P0241	Function
0	P221/P222
1	Not Used
2	Max.Tq.Cur
3	Proc. Var.

NOTE!
This parameter can be changed only with the motor stopped.

P0242 - AI3 Gain

Adjustable range:	0.000 to 9.999	Factory setting:	1.000

Description:

- Refer to P0234.

P0243 - AI3 Signal Type

Adjustable range:	0 to 3	Factory setting:	0

Description:

- Set the S4.1 switch on the EBB optional board to “ON” position when a current signal is used at the analog input AI3.
- For options 2 and 3 inverse reference is attained, that is, maximum speed is obtained with minimum reference.

Table 5.42: AI3 Signal Type

P0243	Function
0	0 to 10V / 0 to 20mA
1	4 to 20 mA
2	10 to 0V / 20 to 0mA
3	20 to 4 mA

NOTE!
This parameter can be changed only with the motor stopped.

P0244 - AI3 Offset

Adjustable range:	-100.0 to 100.0 %	Factory setting:	0.0 %

Description:

- Refer to P0234.

P0245 - AI4 Gain

Adjustable range:	0.000 to 9.999	Factory setting:	1.000

Description:

- Refer to P0234.

NOTE!
Analog Input located on the EBA Optional Board.

P0246 - AI4 Signal Type			
Adjustable range:	0 to 4	Factory setting:	0

Description:

- Set the S2.1 switch on the EBB optional board to “ON” position when a current signal is used at the analog input AI4.
- For options 2 and 3 inverse reference is attained, that is, maximum speed is obtained with minimum reference.

Table 5.43: *AI4 Signal Type*

P0246	Function
0	0 to 10V / 0 to 20mA
1	4 to 20 mA
2	10 to 0V / 20 to 0mA
3	20 to 4 mA
4	-10 to +10V

NOTE!
This parameter can be changed only with the motor stopped.

P0247 - AI4 Offset			
Adjustable range:	-100.0 to 100.0 %	Factory setting:	0.0 %

Description:

- Refer to P0234.

P0248 - AI2 Filter			
Adjustable range:	0.0 to 16.0 s	Factory setting:	0.0 s

Description:

- It sets the time constant of the RC filter of input AI2.
- See Figure 5.31 on page 5-51 .

P0251 - AO1 Function			
Adjustable range:	0 to 24	Factory setting:	2

Description:

- See Table 5.44 on page 5-56 for further details related to the function of analog outputs.
- For values in the factory default (P0251 = 2 and P0252 = 1.000) AO1 = 10 V when Actual Speed = Maximum speed reference (P0134).
- AO1 output may be located on the MVC4 control board (0 to 10) V or on the EBB optional board [AO1’, (0 to 20) mA/ (4 to 20) mA]. When EBB is used, the same signal is available for MVC4.

P0252 - AO1 Gain			
Adjustable range:	0.000 to 9.999	Factory setting:	1.000

Description:

- It sets the gain of analog output AO1. For P0252 = 1.000 the output value of AO1 is set according to the description “analog output indication scale” in P0262.

P0253 - AO2 Function			
Adjustable range:	0 to 24	Factory setting:	5

Description:

- For values in the factory default (P0253 = 5 and P0254 = 1.000) AO1 = 10 V when Motor Current = 1.5 x P0295.
- For values in the factory default (P0253 = 5 and P0254 = 1.000) AO1 = 10 V when Motor Current = 1.5 x P0295.
- AO2 output may be located on the MVC4 control board (0 to 10) V or on the EBB optional board [AO2’, (0 to 20) mA/ (4 to 20) mA]. When EBB is used, the same signal is available for MVC4.

P0254 - AO2 Gain			
Adjustable range:	0.000 to 9.999	Factory setting:	1.000

Description:

- It sets the gain of analog output AO2. For P0254 = 1.000 the output value of AO2 is set according to the description “analog output indication scale” in P0262.

P0255 - AO3 Function			
Adjustable range:	0 to 24	Factory setting:	2

Description:

- With factory default values (P0255 = 2 and P0256 = 1.000) AO3 = 10 V when Actual Speed = Maximum speed reference (P0134).
- Refer to Table 5.87 on page 5-120 for further details regarding the functions of the analog outputs of the MVC3 board.

P0256 - AO3 Gain			
Adjustable range:	0.000 to 9.999	Factory setting:	1.000

Description:

- It sets the gain of analog output AO3. For P0256 = 1.000 the output value of AO3 is set according to the description “analog output indication scale” in P0262.

P0257 - AO4 Function			
Adjustable range:	0 to 24	Factory setting:	5

Description:

- For values in the factory default (P0257 = 5 and P0258 = 1.000) AO1 = 10 V when Motor Current = 1.5 x P0295.
- See Table 5.44 on page 5-56 for further details related to the function of analog outputs.

P0258 - AO4 Gain			
Adjustable range:	0.000 to 9.999	Factory setting:	1.000

Description:

- It sets the gain of analog output AO4. For P0258 = 1.000 the output value of AO4 is set according to the description “analog output indication scale” in P0262.

P0259 - AO5 Function			
Adjustable range:	0 to 24	Factory setting:	2

Description:

- For values in the factory default (P0259 = 2 and P0260 = 1.000) AO5 = 20 mA when Actual Speed = Maximum speed reference (P0134).
- See Table 5.44 on page 5-56 for further details related to the function of analog outputs.

P0260 - AO5 Gain			
Adjustable range:	0.000 to 9.999	Factory setting:	1.000

Description:

- It sets the gain of analog output AO4. For P0260 = 1.000 the output value of AO5 is set according to the description “analog output indication scale” in P0262.

P0261 - AO6 Function			
Adjustable range:	0 to 24	Factory setting:	5

Description:

- For values in the factory default (P0261 = 5 and P0262 = 1.000) AO5 = 20 mA when Motor Current = 1.5 x P0295.
- See Table 5.44 on page 5-56 for further details related to the function of analog outputs.

P0262 - AO6 Gain			
Adjustable range:	0.000 to 9.999	Factory setting:	1.000

Description:

- It sets the gain of analog output AO6. For P0262 = 1.000 the output value of AO6 is set according to the description “analog output indication scale” in P0262.

Table 5.44: *Analog output functions*

Function	P0251 (AO1)	P0253 (AO2)	P0255 (AO3)	P0257 (AO4)	P0259 (AO5)	P0261 (AO6)	Full scale (10V)
Speed reference	0	0	0	0	0	0	1 x P0134
Total reference	1	1	1	1	1	1	1 x P0134
Actual speed	2	2	2	2	2	2	1 x P0134
Not used	3/4	3/4	3/4	3/4	3/4	3/4	
Output current (with filter 0.5 s)	5	5	5	5	5	5	1,5 x P0295
PID process variable	6	6	6	6	6	6	1 x P0528
Active output current	7	7	7	7	7	7	100 % P0295/P0401
Output power	8	8	8	8	8	8	2,0 x P0295 x P0296 x $\sqrt{3}$
PID reference	9	9	9	9	9	9	1 x P0528
Not used	10	10	10	10	10	10	
Trace channel 1 to 8	11 a 18	11 a 18	11 a 18	11 a 18	11 a 18	11 a 18	The same as the one of the chosen parameter
Inverter temperature	19	19	19	19	19	19	200 °C
PLC	20	20	20	20	20	20	
Output voltage	21	21	21	21	21	21	1 x P0296

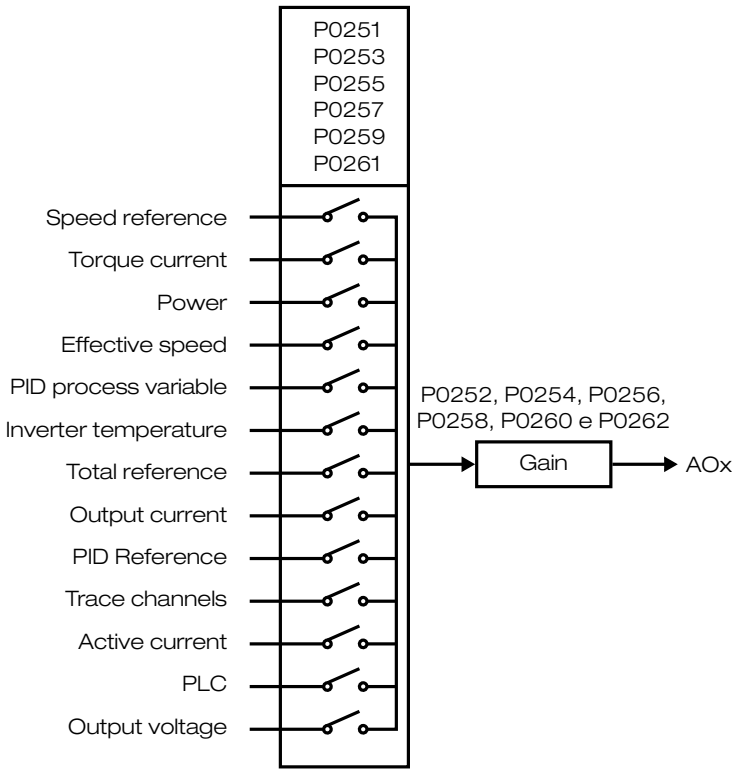


Figure 5.32: *Block diagram of the analog outputs*

- Analog output indication scale:
  - Full scale = 10 V: for outputs AO1, AO2 located on the MVC4 control board and AO3 and AO4 on the EBA optional board.
  - Full scale = 20 mA for outputs AO1' and AO2' located on the optional EBB board and AO5, AO6 located on the MVC4 control board.
  - Speed reference (P0001): full scale = P0134.
  - Total reference: full scale = P0134.
  - Actual speed (P0002): full scale = P0134.
  - Output current: full scale = 1,5 x P0295.
  - PID Process Variable: full scale = 1,0 x P0528.
  - PID reference: full scale = 1,0 x P0528.
  - Inverter temperature = 200 °C.
  - Output power: full scale = 2.0 x P0295 x P0296 x $\sqrt{3}$.

P0263 - DI1 Function			
P0264 - DI2 Function			
P0265 - DI3 Function			
P0266 - DI4 Function			
P0267 - DI5 Function			
P0268 - DI6 Function			
P0269 - DI7 Function			
P0270 - DI8 Function			
P0271 - DI9 Function			
P0272 - DI10 Function			
Adjustable range:	P0263 = 0 to 3 P0264 = 0 to 1 P0265 = 0 to 26 P0266 = 0 to 26 P0267 = 0 to 26 P0268 = 0 to 26 P0269 = 0 to 24 P0270 = 0 to 24 P0271 = 0 to 24 P0272 = 0 to 24	Factory setting:	P0263 = 1 P0264 = 0 P0265 = 0 P0266 = 0 P0267 = 3 P0268 = 6 P0269 = 0 P0270 = 0 P0271 = 0 P0272 = 0

Description:

- The digital input status can be monitored at the parameter P0012 (Digital inputs DI1 to DI10 status).
- Refer to Table 5.45 on page 5-59 , the Figure 5.33 on page 5-57 and Figure 5.35 on page 5-58 for further details regarding the functions of the digital inputs.

  Notes:
  - The **'Electronic Potentiometer'** (E.P.) function allows the speed reference to be adjusted through 2 digital inputs (one to increment it and the other to decrease it). To enable this function, you must first configure the speed reference for E.P., setting P0221 = 7 and/or P0222 = 7. After enabling this function, simply program DI3 or DI5 (P0265 or P0267 = 5) and DI4 or DI6 (P0266 or P0268 = 5). The operation of this function can be seen in Figure 5.37 on page 5-62 . It is important to note that the increase of the reference is made with the application of 24 V at the digital inputs, while the decrease is done with the application of level 0 V. To reset the reference to zero, apply 24 V at the "Increase EP" input and 0 V at the "Decrease EP" input simultaneously with the inverter disabled. Thus:
    'Increase E.P.' (Electronic Potentiometer) is active when DI3 or DI5 = +24 V.
    'Decrease E.P.' (Electronic Potentiometer) is active when DI4 or DI6 = 0 V.
  - **'LOCAL/REMOTE'** = 0 V/24 V in the digital input respectively.
  - DI8 digital input is linked to the input for **'Motor Thermistor'** (PTC) present on the EBA/EBB optional boards, as described in Table 5.45 on page 5-59 :

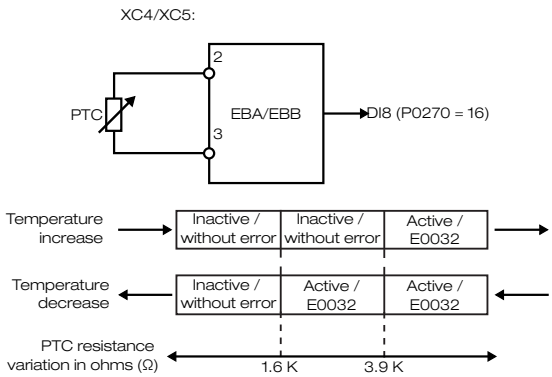
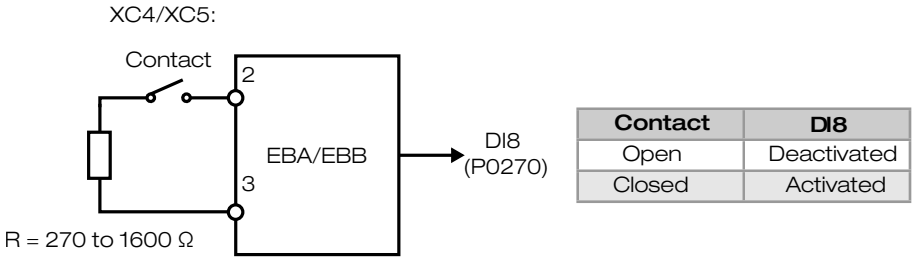


Figure 5.33: *DI8 as a PTC input*

- In order to use the DI8 as a normal digital input, program the designated function at P0270, and connect a resistor, ranging from 270 to 1600 Ω, in series with the contact (Figure 5.34 on page 5-58).



Contact	DI8
Open	Deactivated
Closed	Activated

Figure 5.34: *DI8 as a normal digital input*

- If the function **'Parameterization Disabling'** is programmed and the correspondent DIx in +24 V input is closed, then parameter changes are not allowed, regardless of P0000 and P0200 settings. When the DIx input is open, parameter changes are conditioned to P0000 and P0200 settings.
- **'RL2 and RL3 Timer'**: this function acts as a timer to activate and deactivate the relays 2 and 3 (RL2 and RL3). When the timer function for the relay 2 or 3 is programmed at any DIx, and a transition from open to closed occurs, the programmed relay will be activated with the delay set in P0283 (RL2) or P0285 (RL3). When a transition from closed to open occurs, the programmed relay will be deactivated with the delay adjusted in P0284 (RL2) or P0286 (RL3). After the transition of the DIx, either for activating or deactivating the programmed relay, it is necessary that the DIx remains closed or open during at least the time set in P0283/P0285 and P0284/P0286. Otherwise, the timer will be reset. Refer to the Figure 5.35 on page 5-58. **Note:** In order to enable that function it is also necessary to program P0279 and/or P0280 = 29 (Timer).
- The 'Ventilation OK' function generates an inverter ventilation fault (F0048).

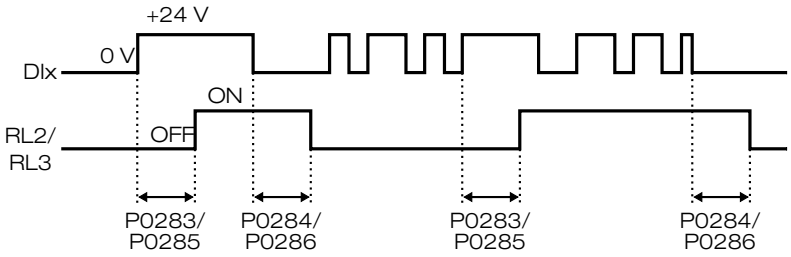


Figure 5.35: *RL2 and RL3 timer function operation*

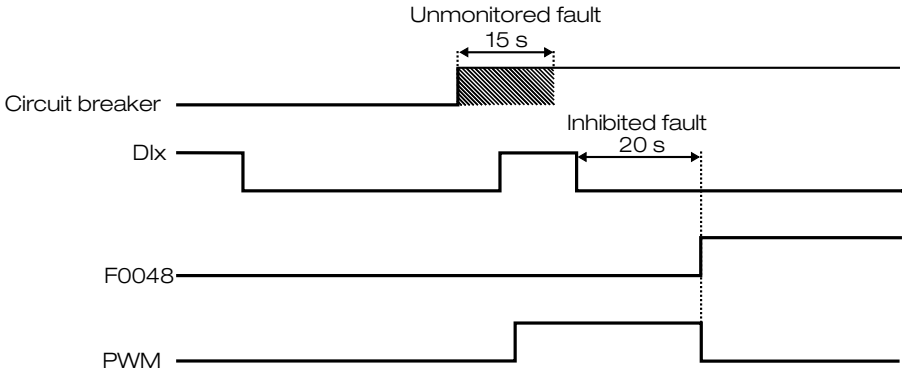


Figure 5.36: *'Ventilation OK' function operation*

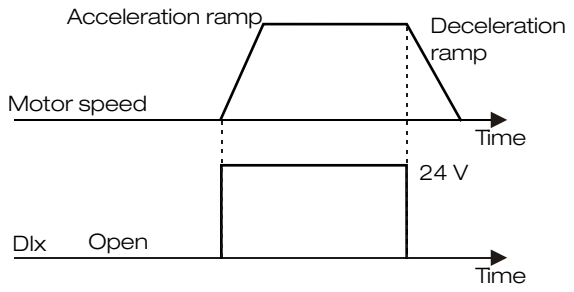
Table 5.45: Digital input functions

Parameter DIx / Function	P0263 (DI1)	P0264 (DI2)	P0265 (DI3)	P0266 (DI4)	P0267 (DI5)	P0268 (DI6)	P0269 (DI7)	P0270 (DI8)	P0271 (DI9)	P0272 (DI10)
Sem Função	0	-	0, 7, 17 and 18	0, 17 and 18	0, 17 and 18	0, 17 and 18	0, 5, 7, 9, 16, 17 and 18	0, 5, 7, 9, 17 and 18	0, 5, 7, 9, 17 and 18	0, 5, 7, 9, 17 and 18
Start/Stop	1	-	-	-	-	-	-	-	-	-
General Enable	2	-	2	2	2	2	2	2	2	2
Stop by ramp	3	-	-	-	8	8	8	8	8	8
Forward/Reverse	-	0	-	-	-	-	-	-	-	-
Local/Remote	-	1	1	1	1	1	1	1	1	1
JOG	-	-	3	3	3	3	3	3	3	3
No external fault	-	-	4	4	4	4	4	4	4	4
Increase E.P.	-	-	5	-	5	-	-	-	-	-
Decrease E.P.	-	-	-	5	-	5	-	-	-	-
2nd ramp	-	-	6	6	6	6	6	6	6	6
Multispeed (MSx)	-	-	-	7	7	7	-	-	-	-
Forward run	-	-	8	-	-	-	-	-	-	-
Reverse run	-	-	-	8	-	-	-	-	-	-
Sinusoidal filter circuit breaker	-	-	9	9	9	9	-	-	-	-
JOG+	-	-	10	10	10	10	10	10	10	10
JOG-	-	-	11	11	11	11	11	11	11	11
Reset	-	-	12	12	12	12	12	12	12	12
Fieldbus	-	-	13	13	13	13	13	13	13	13
Start	-	-	14	-	14	-	14	-	-	-
Stop	-	-	-	14	-	14	-	14	14	14
Manual/Automatic	-	-	15	15	15	15	15	15	15	15
No external alarm	-	-	16	16	16	16	-	-	16	16
Motor thermistor	-	-	-	-	-	-	-	16	-	-
Parameterization disabling	-	-	19	19	19	19	19	19	-	-
RL2 timer	-	-	21	21	21	21	21	21	-	-
RL3 timer	-	-	22	22	22	22	22	22	-	-
No motor fault	-	-	-	-	-	-	-	-	19	19
No motor alarm	-	-	-	-	-	-	-	-	20	20
No alarm in the redundant ventilation set A	-	-	23	23	23	23	-	-	21	21
No alarm in the redundant ventilation set B	-	-	24	24	24	24	-	-	22	22
Initiates synchronous transfer	-	-	25	25	25	25	23	23	23	23
Ventilation OK	-	-	26	26	26	26	24	24	24	24
Transformer OK	-	-	27	27	27	27	25	25	25	25
Pressurization system OK	-	-	28	28	28	28	26	26	26	26
Output filter OK	-	-	29	29	29	29	27	27	27	27
Exciter OK	-	-	30	30	30	30	28	28	28	28

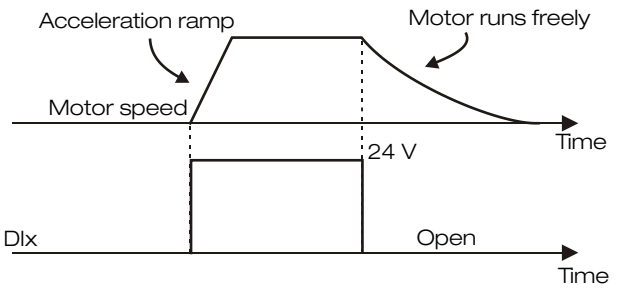
NOTE!
In order that Start/Stop works, configure also P0224 and/or P0227 = 1. The selection of P0265 or P0267 = 5, and P0266 or P0268 = 5, also requires the configuration of P0221 and/or P0222 = 7. The selection of P0266 and/or P0267 and/or P0268 = 7 also requires the configuration of P0221 and/or P0222 = 8.

NOTE!
The functions “No external alarm”, “No motor alarm”, “No alarm in the redundant ventilation set A” and “No alarm in the redundant ventilation set B”, occur by edge detection, as they are functions with low assets. That is, if the electronics are energized with the DI at low level, no alarm occurs.

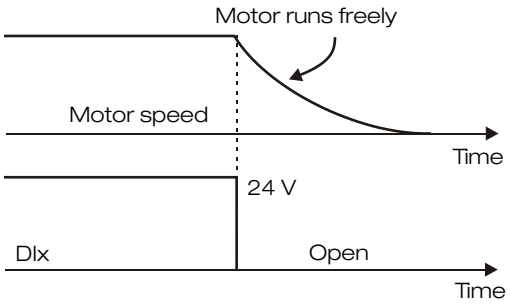
a) START/STOP



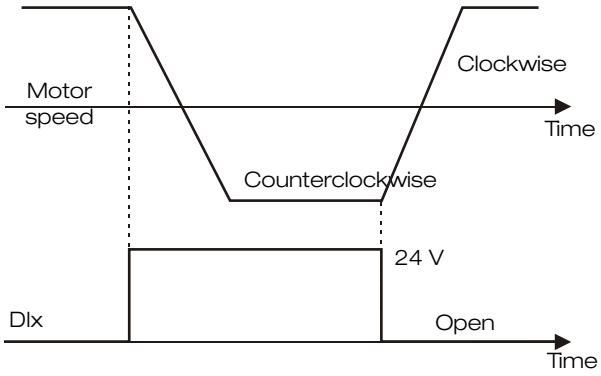
b) GENERAL ENABLE



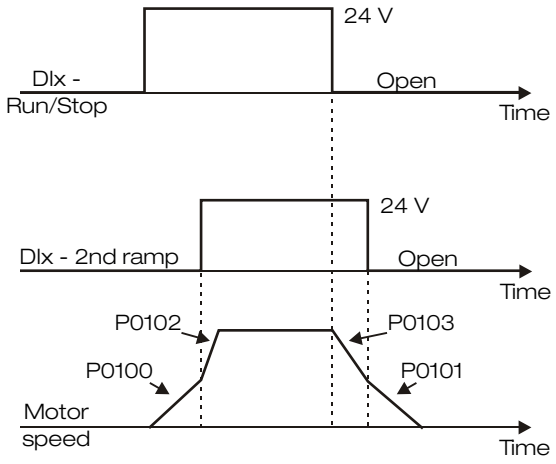
c) NO EXTERNAL FAULT



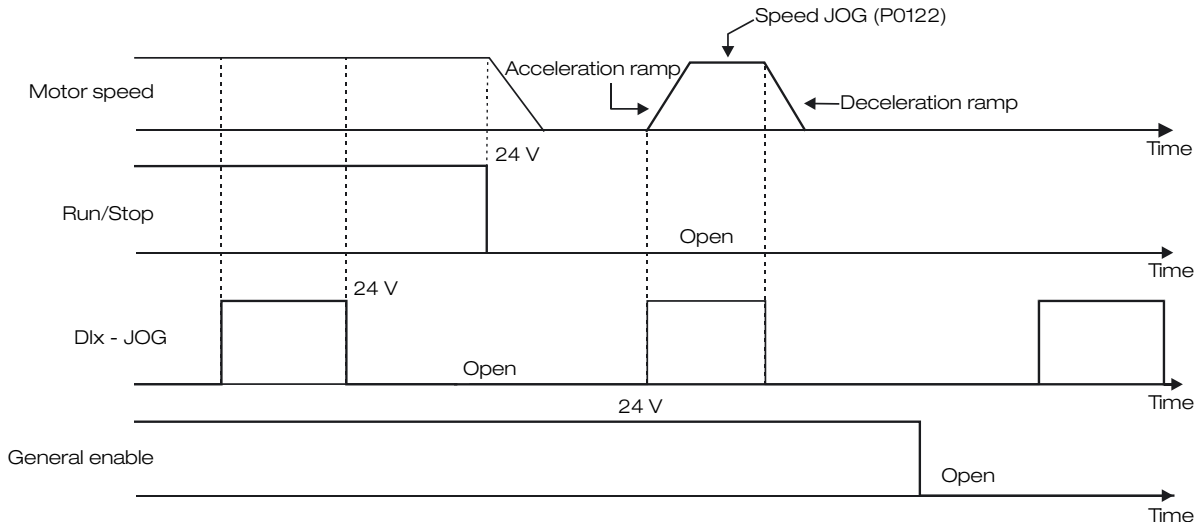
d) FORWARD/REVERSE



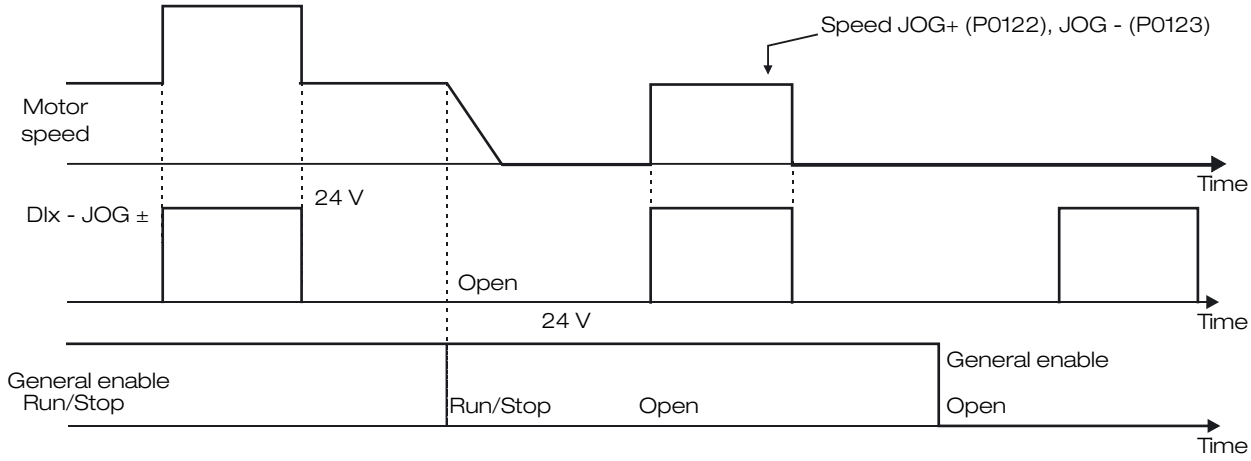
e) 2nd RAMP



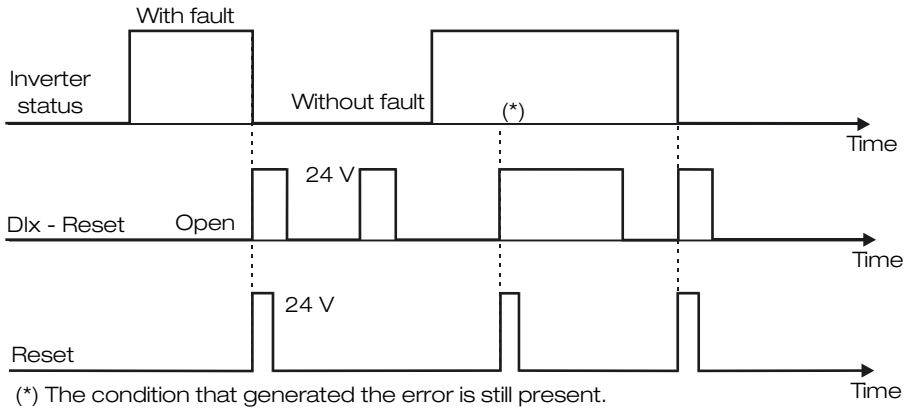
g) JOG



h) JOG + and JOG -

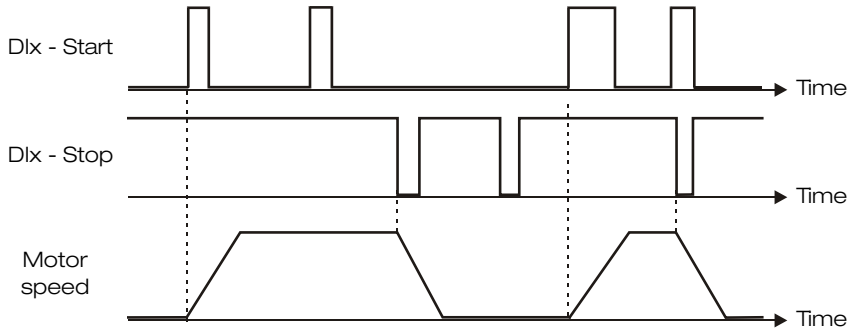


i) RESET

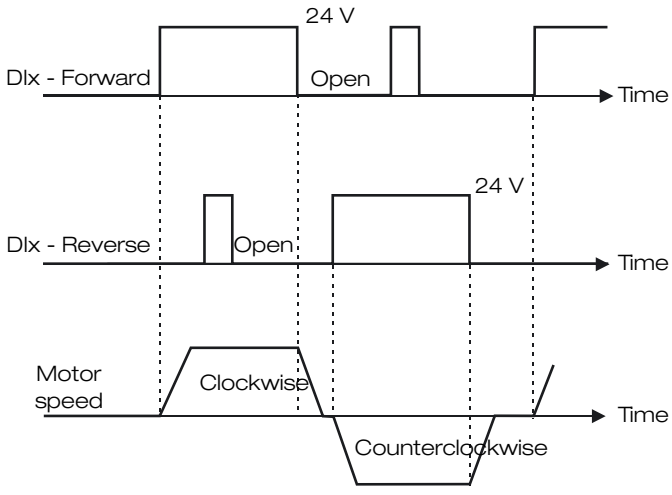


(*) The condition that generated the error is still present.

j) 3-WIRE START/STOP



k) FORWARD RUN/REVERSE RUN



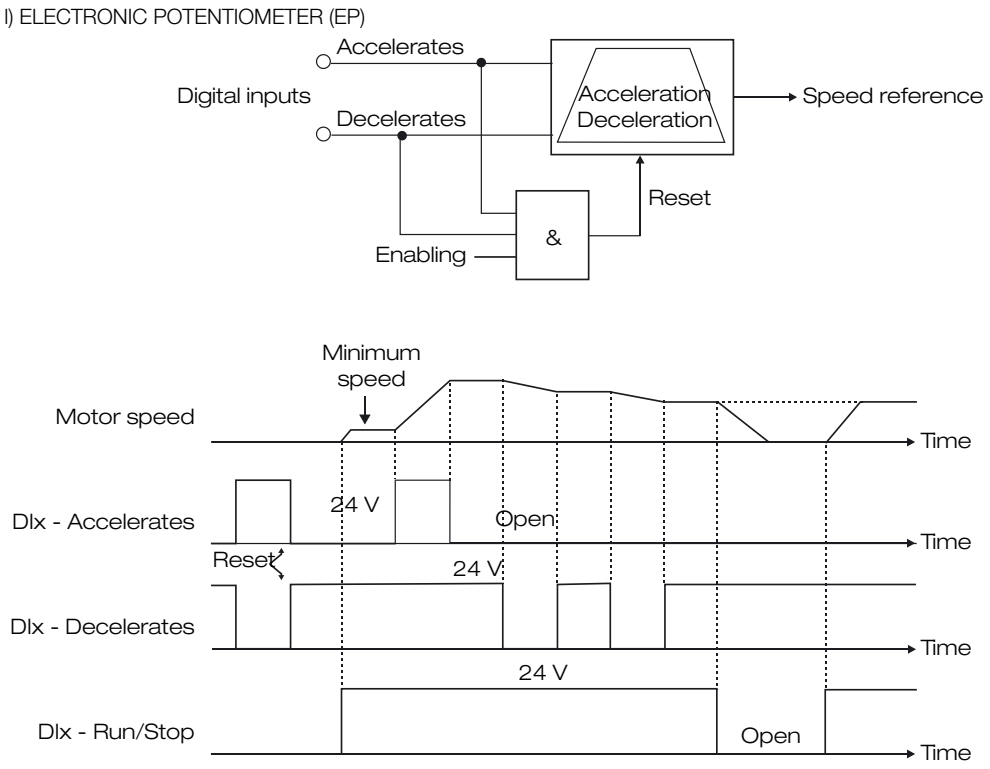


Figure 5.37: *(a) to (l) Details on the operation of the digital input functions*

NOTE!
This parameter can be changed only with the motor stopped.

P0275 - DO1 Function			
P0276 - DO2 Function			
P0277 - RL1 Function			
P0279 - RL2 Function			
P0280 - RL3 Function			
P0281 - RL4 Function			
P0282 - RL5 Function			
Adjustable range:	0 to 38	Factory setting:	P0275 = 0 P0276 = 0 P0277 = 13 P0279 = 2 P0280 = 1 P0281 = 0 P0282 = 0

Description:

- The digital and relay output status can be monitored at the parameter P0013.
- Refer to Table 5.46 on page 5-64 and the Figure 5.38 on page 5-66 for more details regarding the digital outputs and relays.
- When the condition declared by the function is true, the digital output will be activated, i.e., a saturated transistor at a DOx output and/or a relay with energized coil for a RLx output
  Example: 'Is > Ix': when Is > Ix, then DOx = saturated transistor and/or RLx = relay with the coil energized. When Is = Ix then DOx = open transistor and/or RLx = relay with the coil not energized.

Notes:

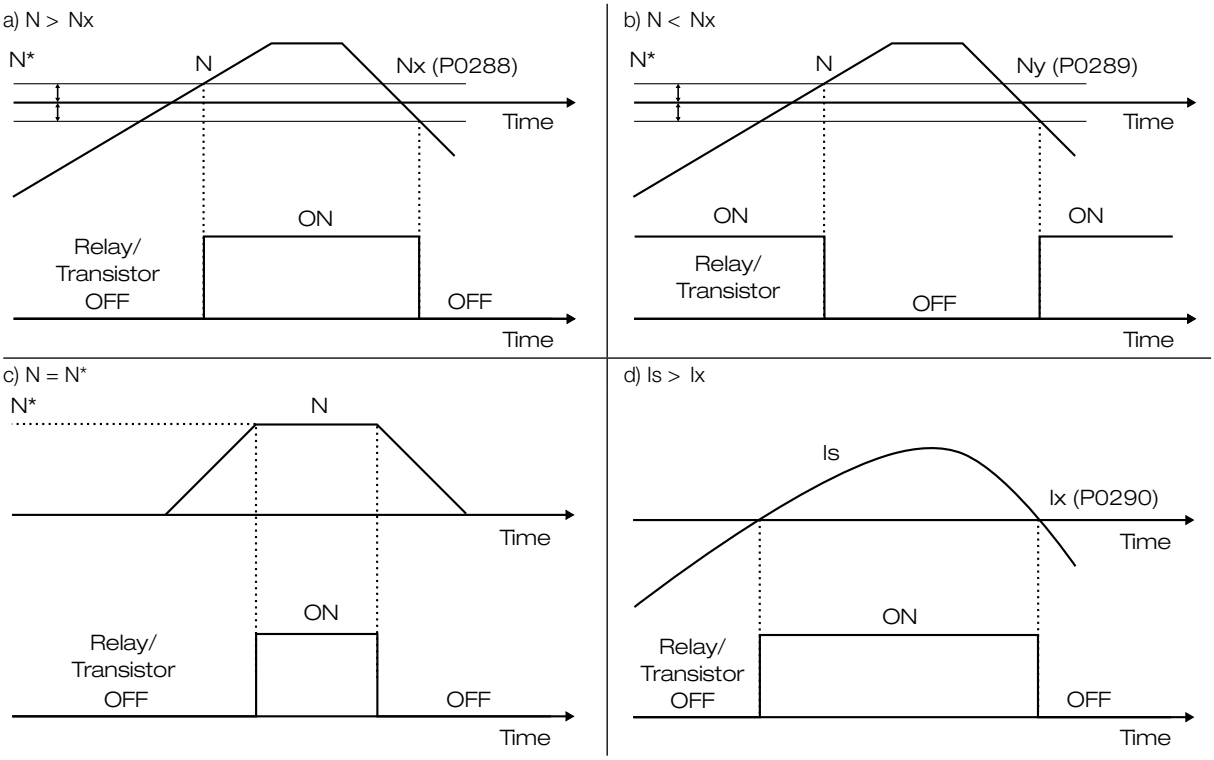
- **'Not Used'** it means that the digital outputs will remain always in a resting state, i.e., DOx = open transistor and/or RLx = relay with the coil not energized.
- **'N = 0'** it means that the motor speed is below the value adjusted in P0291 (Zero Speed Zone).
- **'Remote'** it means that the inverter is operating in Remote situation.
- **'Run'** it corresponds to enabled inverter. In this state, the IGBTs are commutating, and the motor may be at any speed, even zero speed.
- **'Ready'** it corresponds to the inverter without error and without undervoltage.
- **'No Fault'** it means that the inverter is not disabled by any type of fault.
- **'No F0070+F0071'** it means that the inverter is not disabled by faults F0070 or F0071.
- **'No F0072'** it means that the inverter is not disabled by faults F0072.
- **'4 to 20 mA Reference OK'** it means that the reference in current is within the 4 to 20 mA range.
- **'Forward'** it means that when the motor is rotating in the forward direction, the DOx = saturated transistor and/or RLx = relay with the coil energized. When the motor is rotating in the reverse direction, the DOx = open transistor and/or RLx = relay with the coil not energized.
- **'Pre-charge OK'** it means that the DC Link voltage is above the pre-charge voltage level.
- **'Fault'** it means that the inverter is disabled by a fault.
- **'N > Nx and Nt > Nx'** it means that both the conditions must be satisfied, so that DOx = saturated transistor and/or RLx = relay with the coil energized. In order that the digital outputs go back to the resting state, i.e., DOx = open transistor and/or RLx = relay with the coil not energized, it is necessary that only the condition N > Nx not be satisfied anymore (regardless of the Nt > Nx condition).

Definition of the symbols used with the functions:

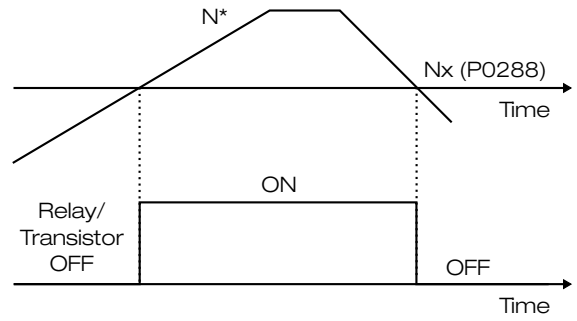
- N* = P0001 (Motor speed reference);
- N = P0002 (Motor Speed);
- Nx = P0288 (Nx Speed) - It is a reference point of the speed selected by the user.
- Ny = P0289 (Ny Speed) - It is a reference point of the speed selected by the user.
- Ix = P0290 (Ix Current) - It is a reference point of the current selected by the user.
- Is = P0003 (Motor Current);
- Torque = P0009 (Motor Torque);
- VPx = P0533 (Process variable X value) - It is a reference point of the process variable selected by the user.
- VPy = P0534 (Process variable Y value) - It is a reference point of the process variable selected by the user.
- Nt = Total Reference (refer to Figure 5.25 on page 5-44).

Table 5.46: Digital and relay output functions

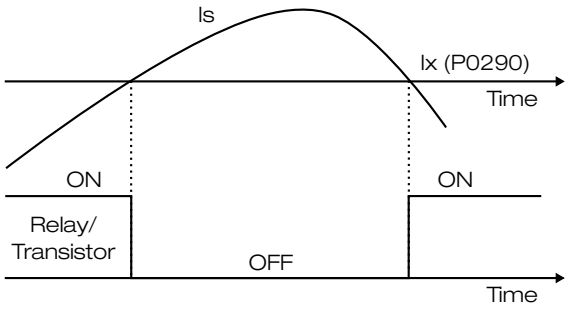
DOx Parameter / Function	P0275 (DO1)	P0276 (DO2)	P0277 (RL1)	P0279 (RL2)	P0280 (RL3)	P0281 (RL4)	P0282 (RL5)
Not Used	0, 8, 9, 23 and 29	0, 8, 9, 23 and 29	0, 8, 9, 23 and 29	0, 8, 9 and 23	0, 8, 9 and 23	0, 8, 9, 23 and 29	0, 8, 9, and 29
N* > Nx	1	1	1	1	1	1	1
N > Nx	2	2	2	2	2	2	2
N < Ny	3	3	3	3	3	3	3
N = N*	4	4	4	4	4	4	4
N = 0	5	5	5	5	5	5	5
Is > Ix	6	6	6	6	6	6	6
Is < Ix	7	7	7	7	7	7	7
Remote	10	10	10	10	10	10	10
Run	11	11	11	11	11	11	11
Ready	12	12	12	12	12	12	12
No Fault	13	13	13	13	13	13	13
No F0070 + F0071	14	14	14	14	14	14	14
No F0072	17	17	17	17	17	17	17
4 to 20 mA OK	18	18	18	18	18	18	18
Fieldbus	19	19	19	19	19	19	19
Forward	20	20	20	20	20	20	20
Process variable >VPx	21	21	21	21	21	21	21
Process variable <VPy	22	22	22	22	22	22	22
Pre-charge OK	24	24	24	24	24	24	24
Fault	25	25	25	25	25	25	25
N > Nx and Nt > Nx	26	26	26	26	26	26	26
Without Fault with delay	27	27	27	27	27	27	27
No Alarm	28	28	28	28	28	28	28
Timer	-	-	-	29	29	-	-
Redundant ventilation	30	30	30	30	30	30	30
PLC	-	-	31	31	31	-	-
Circuit Break ON (Input Circuit Breaker ON)	32	32	32	32	32	32	32
Transference OK	33	33	33	33	33	33	33
Synchronism OK	34	34	34	34	34	34	34
Serial	35	35	35	35	35	35	35



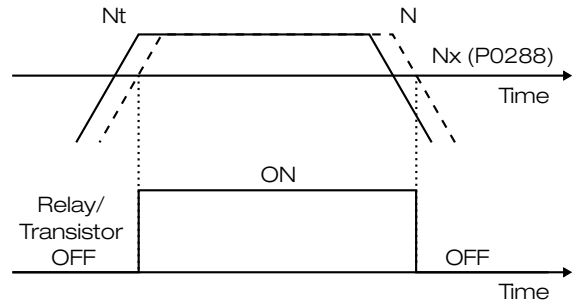
e) N* > Nx



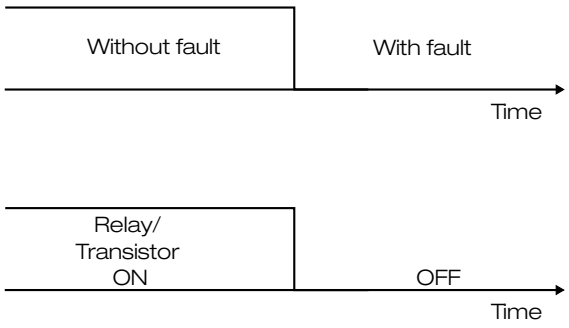
f) Is < Ix



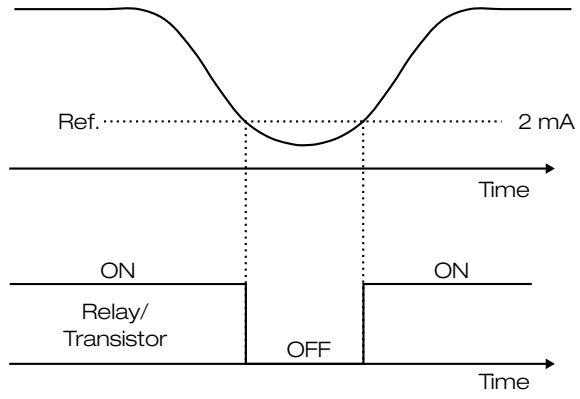
g) N > Nx and Nt > Nx



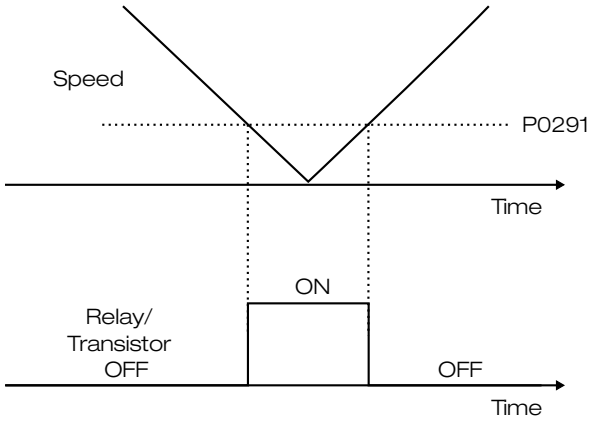
h) No external Fault



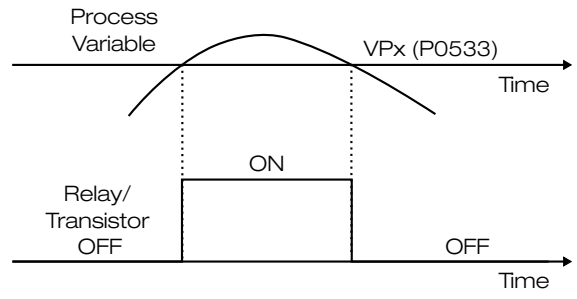
i) 4 to 20 mA reference



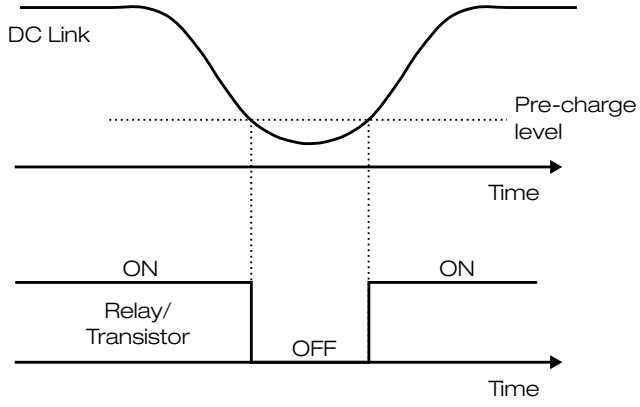
j) N = 0



k) Process variable X > VPx



l) Pre-charge OK



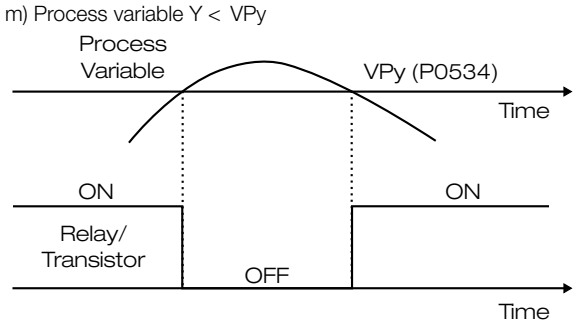


Figure 5.38: *(a) to (m) - Details on the operation of the digital output functions*

NOTE!
This parameter can be changed only with the motor stopped.

5

P0283 - RL2 ON Time			
P0284 - RL2 OFF Time			
P0285 - RL3 ON Time			
P0286 - RL3 OFF Time			
Adjustable range:	0.0 to 300.0 s	Factory setting:	0.0 s

Description:

- Used in the relay output functions: Timers of relays 2 and 3.

P0288 - Nx Speed			
P0289 - Ny Speed			
Adjustable range:	0 to 4095 rpm	Factory setting:	P0288 = 120 rpm P0289 = 1800 rpm

Description:

- Used in the digital and relay output functions: N* > Nx, N > Nx and N < Ny.

P0290 - Ix Current			
Adjustable range:	0.0 to 3276.7 A	Factory setting:	300.0 A

Description:

- Used in the digital and relay output functions: Is > Ix and Is < Ix.

P0291 - Zero Speed Zone			
Adjustable range:	1 to 100 %	Factory setting:	1 %

Description:

- Used in the digital and relay output functions: N = 0 and in the “Stop Logic” (Disable by N = 0; refer to P0211 and P0212).

P0292 - N=N* Band			
Adjustable range:	1 to 100 %	Factory setting:	1 %

Description:

- Used in the digital and relay output functions: N = N*.

P0294 - Overload Class			
Adjustable range:	0 to 2	Factory setting:	0

Description:

- Overload Class.

Table 5.47: *Overload Class*

P0294	Function
0	ND 15% VT
1	HD 50% CT
2	MX 0% NO

NOTE!
This parameter can be changed only with the motor stopped.

P0295 - Inverter rated current			
Adjustable range:	0 to 219	Factory setting:	106

Description:

- It defines the inverter rated current according to the available models.

Adjustable range				
0 = G1 32 A	40 = G1 950 A	96 = G2 216 A	136 = G2 1254 A	185 = G3 276 A
1 = G1 53 A	41 = G1 1178 A	97 = G2 237 A	137 = G2 1425 A	186 = G3 294 A
2 = G1 70 A	42 = G1 200 A	98 = G2 241 A	138 = G2 1482 A	187 = G3 322 A
3 = G1 80 A	43 = G1 125 A	99 = G2 251 A	139 = G2 1632 A	188 = G3 330 A
4 = G1 85 A	44 = G1 536 A	100 = G2 260 A	140 = G2 1881 A	189 = G3 376 A
5 = G1 94 A	45 = G1 1072 A	101 = G2 276 A	141 = G2 2138 A	190 = G3 400 A
6 = G1 100 A	46 = G1 1340 A	102 = G2 283 A	142 = G2 2508 A	191 = G3 450 A
7 = G1 110 A	47 = G1 1424 A	103 = G2 294 A	143 = G2 2850 A	192 = G3 500 A
8 = G1 112 A	48 = G1 1760 A	104 = G2 295 A	144 = G2 460 A	193 = G3 560 A
9 = G1 120 A	49 = G1 1900 A	105 = G2 322 A	145 = G2 480 A	194 = G3 607 A
10 = G1 130 A	50 = G1 2356 A	106 = G2 330 A	146 = G2 874 A	195 = G3 627 A
11 = G1 138 A	51 = G1 301 A	107 = G2 332 A	147 = G2 912 A	196 = G3 713 A
12 = G1 140 A	52 = G1 670 A	108 = G2 348 A	148 = G2 1311 A	197 = G3 760 A
13 = G1 150 A	53 = G1 730 A	109 = G2 376 A	149 = G2 1748 A	198 = G3 885 A
14 = G1 160 A	70 = G2 54 A	110 = G2 390 A	150 = G2 2622 A	199 = G3 950 A
15 = G1 162 A	71 = G2 58 A	111 = G2 405 A	151 = G2 3496 A	200 = G3 1064 A
16 = G1 165 A	72 = G2 67 A	112 = G2 410 A	152 = G2w 312 A	201 = G3 1140 A
17 = G1 170 A	73 = G2 73 A	113 = G2 440 A	153 = G2w 396 A	202 = G3 1170 A
18 = G1 175 A	74 = G2 78 A	114 = G2 458 A	154 = G2 495 A	203 = G3 1283 A
19 = G1 186 A	75 = G2 86 A	115 = G2 481 A	155 = G2w 1013 A	204 = G3 1425 A
20 = G1 188 A	76 = G2 91 A	116 = G2 494 A	156 = G2w 1853 A	205 = G3 1520 A
21 = G1 210 A	77 = G2 92 A	117 = G2 517 A	157 = G2w 598 A	206 = G3 1596 A
22 = G1 235 A	78 = G2 96 A	118 = G2 538 A	158 = G2w 382 A	207 = G3 1710 A
23 = G1 250 A	79 = G2 108 A	119 = G2 561 A	159 = G3w 527 A	208 = G3 1900 A
24 = G1 265 A	80 = G2 109 A	120 = G2 565 A	160 = G2w 550 A	209 = G3 2128 A
25 = G1 280 A	81 = G2 113 A	121 = G2 607 A	161 = G2w 338 A	210 = G3 2280 A
26 = G1 300 A	82 = G2 114 A	122 = G2 627 A	162 = G3w 962 A	211 = G3 2565 A
27 = G1 310 A	83 = G2 128 A	123 = G2 631 A	163 = G3w 1140 A	212 = G3 2850 A
28 = G1 357 A	84 = G2 131 A	124 = G2 664 A	164 = G3w 359 A	213 = G3 3040 A
29 = G1 375 A	85 = G2 139 A	125 = G2 713 A	165 = G3w 460 A	214 = G3 3192 A
30 = G1 386 A	86 = G2 144 A	126 = G2 740 A	166 = G3w 1124 A	215 = G3 3420 A
31 = G1 450 A	87 = G2 151 A	127 = G2 741 A	167 = G3w 1136 A	216 = G3 3800 A
32 = G1 475 A	88 = G2 152 A	128 = G2 779 A	168 = G3w 1214 A	217 = G3 4256 A
33 = G1 490 A	89 = G2 176 A	129 = G2 816 A	169 = G3w 1413 A	218 = G3 750 A
34 = G1 500 A	90 = G2 177 A	130 = G2 835 A	170 = G3w 1704 A	219 = G3 1413
35 = G1 560 A	91 = G2 180 A	131 = G2 934 A	180 = G3 181 A	
36 = G1 580 A	92 = G2 181 A	132 = G2 941 A	181 = G3 204 A	
37 = G1 1064 A	93 = G2 204 A	133 = G2 1069 A	182 = G3 216 A	
38 = G1 712 A	94 = G2 205 A	134 = G2 1087 A	183 = G3 237 A	
39 = G1 880 A	95 = G2 212 A	135 = G2 1234 A	184 = G3 260 A	

5

NOTE!
This parameter can be changed only with the motor stopped.

P0296 - Inverter rated voltage

Adjustable range: 0 to 6 Factory setting: 4

Description:

- It defines the inverter rated voltage according to the available models.

WARNING!
Adjust P0296 according to the input voltage to be used!

Table 5.48: Inverter rated voltage

P0296	Function
0	220/230 V
1	380 V
2	2.3 kV
3	3.3 kV
4	4.16 kV
5	6.9 kV
6	4.6 kV

NOTE!
This parameter can be changed only with the motor stopped.

P0303 - Skipped Speed 1
P0304 - Skipped Speed 2
P0305 - Skipped Speed 3
P0306 - Skipped Range

Adjustable range:	P0303 = 0 to 4095 rpm P0304 = 0 to 4095 rpm P0305 = 0 to 4095 rpm P0306 = 0 to 750 rpm	Factory setting:	P0303 = 600 rpm P0304 = 900 rpm P0305 = 1200 rpm P0306 = 0 rpm

Description:

- It avoids permanent motor operation at speeds in which, for instance, the mechanical system enters into resonance causing high vibration or noise levels.
- The passage through the skipped range (2 x P0306) occurs through the acceleration and deceleration ramps.
- The function does not operate properly if two bands of skipped speed overlap.

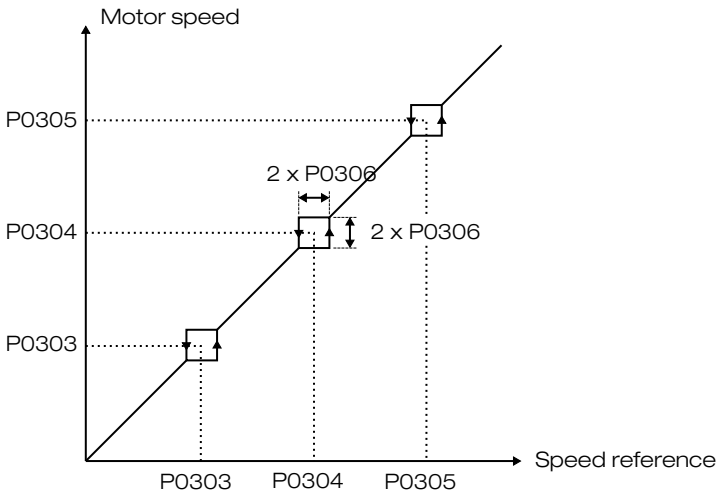


Figure 5.39: Skipped speed curve

P0308 - Serial address

Adjustable range:	1 to 30	Factory setting:	1

Description:

- It sets the inverter address for serial communication.
- Refer to Section 7.2 SERIAL on page 7-29 .

NOTE!
This parameter can be changed only with the motor stopped.

P0309 - Fieldbus

Adjustable range:	0 to 13	Factory setting:	0

Description:

- Define the Fieldbus standard to be used and the number of variables to be exchanged with the master.
- For P0309 = 10, refer to the DeviceNet Drive Profile Guide.
- Ethernet configurations cover the Ethernet/IP, Profinet-IO and Modbus TCP/IP protocols.

Table 5.49: *Fieldbus*

P0309	Function
0	Off
1	Ethernet/IP 2 I/O
2	Profibus DP 4 I/O
3	Profibus DP 6 I/O
4	DeviceNet 2 I/O
5	DeviceNet 4 I/O
6	DeviceNet 6 I/O
7	Modbus-RTU 2 I/O
8	Modbus-RTU 4 I/O
9	Modbus-RTU 6 I/O
10	DeviceNet Drive Profile
11	Ethernet 2 I/O
12	Ethernet 4 I/O
13	Ethernet 6 I/O

NOTE!
This parameter can be changed only with the motor stopped.

P0312 - Type of serial protocol

Adjustable range:	0 to 11	Factory setting:	7

Description:

- It defines the type of protocol used for serial communication.

Table 5.50: *Type of serial protocol*

P0312	Function
0	WEG Protocol, 9600 bps
1	Modbus-RTU, 9600 bps, no parity
2	Modbus-RTU, 9600 bps, odd parity
3	Modbus-RTU, 9600 bps, even parity
4	Modbus-RTU, 19200 bps, no parity
5	Modbus-RTU, 19200 bps, odd parity
6	Modbus-RTU, 19200 bps, even parity
7	Modbus-RTU, 38400 bps, no parity
8	Modbus-RTU, 38400 bps, odd parity
9	Modbus-RTU, 38400 bps, even parity
10	WEG Protocol, 19200 bps
11	WEG Protocol, 38400 bps

NOTE!
This parameter can be changed only with the motor stopped.

P0313 - Action for communication error			
Adjustable range:	0 to 5	Factory setting:	0

Description:

- It defines the inverter behavior when the serial communication is inactive (causing A0128), when the physical connection with the Fieldbus network master is interrupted (causing error A0129), when the Fieldbus board is inactive (causing error A0130) or when the communication between MVC3 and MVC4 boards is interrupted.

Table 5.51: *Action for communication error*

P0313	Function
0	Ramp stop
1	General disable
2	No action
3	Change to LOC
4	Reserved
5	Fault

P0314 - Time for serial watchdog action			
Adjustable range:	0.0 to 999.0 s	Factory setting:	0.0 s

Description:

- If the inverter does not receive any valid serial telegram after the time programmed in P0314, has elapsed, A0128 will be indicated on the HMI and the inverter will execute the action programmed in P0313 - Disabling with A0128/A0129/A0130.
- For the inverter to be able to execute that action, it is necessary that the commands be programmed for the “Serial” option in parameters P0220 to P0228.

Table 5.52: *Time for serial watchdog action*

P0314	Function
0.0	Disabled
0.1 a 999.0	Enabled

NOTE!
This parameter can be changed only with the motor stopped.

P0315 - Function of the MVC3 SCI1 serial channel			
Adjustable range:	0 to 2	Factory setting:	0

Description:

- It selects the function of the SCI1 serial channel of the MVC3 control board.

The module serial configuration must be set as follows:

- Baudrate: 2400 bps
- Slave address: 1
- Parity: even
- Stop bit: 1

WARNING!
In the **PRG** (programming) and **VIS** (programming visualization) functions of the thermal protection relay, the communication with the inverter is temporarily disabled and can cause a communication time-out, in this situation the inverter disables the output, protecting the motor from possible damage.

Table 5.53: *Function of the MVC3 SCI1 serial channel*

P0315	Function
0	HMI
1	TecSystem
2	Pextron

P0320 - Flying Start/ Ride-Through

Adjustable range:	0 to 3	Factory setting:	0

Description:

- It determines whether the Flying Start and Ride-Through functions are active.

NOTE!
With the Ride-Through function active, disable function 27 of the protection relay of the input.

Table 5.54: *Flying Start/ Ride-Through*

P0320	Function
0	Off
1	Fly Start
2	FS / RT
3	Ride-Thru

NOTE!
This parameter can be changed only with the motor stopped.

P0321 - Ud Power Loss
P0322 - Ud Ride-Through
P0323 - Ud Power Back

Adjustable range:	356 to 8000 V	Factory setting:	P0321 = 4850 V P0322 = 4700 V P0323 = 5300 V

Description:

- The occurrence of the Ride-Through function can be visualized at the outputs DO1, DO2, RL1, RL2 and/or RL3 (P0275, P0276, P0277, P0279 and/or P0280) if they have been programmed as “23 = Not Used”

NOTE!
When either Ride-Through, is activated, the parameter P0214 (Line phase loss detection) is automatically set to 0 = Off.

- For inverters of rated voltage of 6000 V, 6300 V and 6600 V you must set P0296 = 5 (6.9 kV); however for those values of rated voltage, P0321 must be manually set to:
  6000 V - 4038 V
  6300 V - 4240 V
  6600 V - 4442 V

NOTE!
Ud = Vca x 1.35

Ride-Through Vector Control (P0202 = 3 or 4):

- The purpose of the Ride-Through function in vector mode (P0202 = 3 or 4) is to assure that the inverter keeps the motor running without interruption or fault storage during a power failure. The energy necessary to maintain the inverter operation is obtained from the motor/load kinetic energy (inertia) through its controlled deceleration. After the recovery of the line, the motor accelerates again to the speed reference value.
- After the line loss (t0), the DC Link voltage (Ud) starts decreasing according to a rate dependent on the motor load, it could reach the undervoltage level (t2) if the Ride-Through function were not active.
- With the Ride-Through function active, the line loss is detected when the Ud voltage drops below the value “Ud Line loss” (t1). Immediately the inverter keeps the input circuit breaker closed and it begins the controlled deceleration of motor, regenerating energy for the DC link so as to keep the motor running with the Ud voltage regulated a the “Ud Ride-Through” value.
- If the line does not return, the inverter remains in this condition as long as possible (depending on the inertia load) until undervoltage fault (F0021) occurs at (t5). If the line returns (t3) before the undervoltage fault, the inverter detects it when the Ud voltage reaches the “Ud Recovery Level” (t4). Then the motor is accelerated, according to the adjusted ramp time, from the actual speed up to the active speed reference value (See Figure 5.40 on page 5-73).
- If the line voltage falls in a region between P0322 and P0323 the values of P0321, P0322 and P0323 must be readjusted.
- For inverters of rated voltage of 6000 V, 6300 V and 6600 V, you must set P0296 = 5 (6.9 kV); however for those values of rated voltage, P0322 must be manually set to:
  6000 V - 3914 V
  6300 V - 4190 V
  6600 V - 4305 V

NOTE!
The Ride-Through function activation occurs when the power supply voltage is lower than the value (P0321÷1.35).

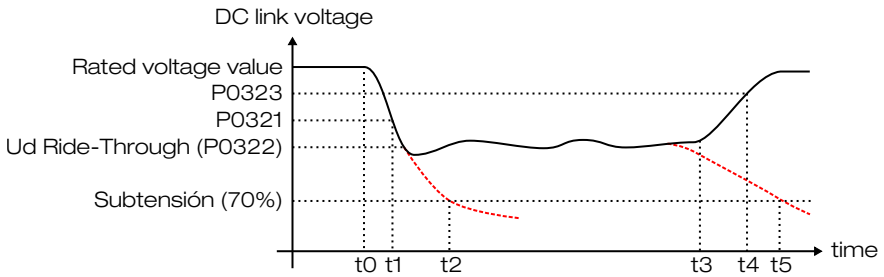


Figure 5.40: *Actuation of the Ride-Through function in Vector Control mode*

- t0 - Line loss.
- t1 - Line loss detection.
- t2 - Undervoltage fault trip (F0021 without Ride-Through).
- t3 - Line return.
- t4 - Line return detection.
- For inverters of rated voltage of 6000 V, 6300 V and 6600 V, you must set P0296 = 5 (6.9 kV); however for those values of rated voltage, P0323 must be manually set to:
  6000 V - 4413 V
  6300 V - 4634 V
  6600 V - 4855 V

NOTE!
This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0325 - Ride-Thru P Gain			
P0326 - Ride-Thru I Con.			
Adjustable range:	P0325 = 0.0 to 63.9 P0326 = 0 to 9999	Factory setting:	P0325 = 1.0 P0326 = 201

Description:

- The factory settings for P0325/P0326 are adequate for the majority of the applications. Do not change these parameter settings.

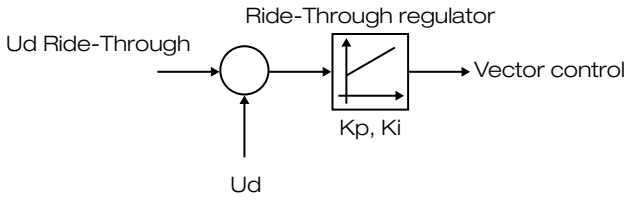


Figure 5.41: *Ride-Through PI controller*

NOTE!
This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless).

P0327 - Sensorless flying start delay			
Adjustable range:	0.000 to 9.999 s	Factory setting:	0.100 s

Description:

- It is the delay to change the Sensorless Flying Start searching direction.

NOTE!
- This parameter can be changed only with the motor stopped.
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless).

P0328 - Sensorless flying start frequency			
Adjustable range:	0 to 1	Factory setting:	1

Description:

- It defines the initial search frequency of the Flying Start.

Table 5.55: *Sensorless flying start frequency*

P0328	Function
0	P134
1	P001

NOTE!
This parameter is only visible on the HMI when: the control type is scalar or sensorless vector, P0202 = 0, 1 or 2 (Scalar control) or P0202 = 4 (Encoder).

P0329 - Sensorless flying start direction			
Adjustable range:	0 to 3	Factory setting:	0

Description:

- It is the sensorless Flying Start initial searching direction.

Table 5.56: *Sensorless flying start direction*

P0329	Function
0	+ P328 -
1	- P328 +
2	+ P328
3	- P328

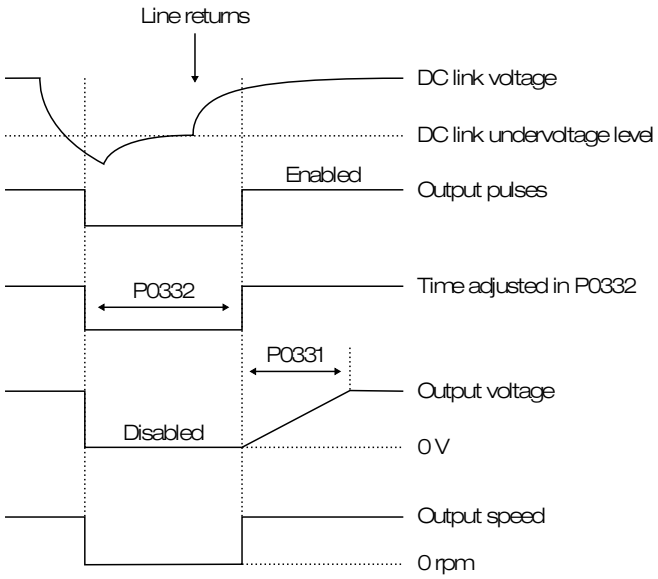
NOTE!
This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless).

P0331 - Voltage ramp time setting			
P0332 - Dead Time			
P0333 - Ride-Through Time			
Adjustable range:	P0331 = 0.2 to 50.0 s P0332 = 0.1 to 40.0 s P0333 = 0.0 to 20.0 s	Factory setting:	P0331 = 8.0 s P0332 = 10.0 s P0333 = 10.0 s

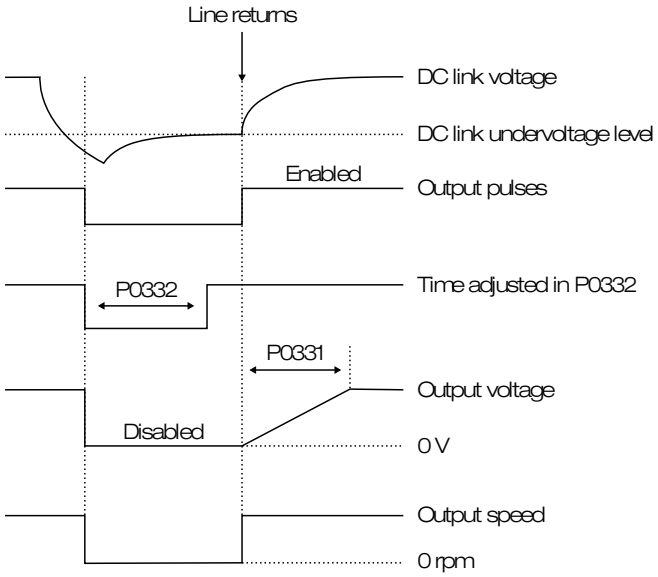
Description: Actuation with P0202 = 0, 1 or 2 (V/f Control):

- Parameter P0331 sets the time required for the output voltage, starting from 0 V, to reach the nominal voltage.
- The Flying Start function allows starting a spinning motor. This function only acts when the inverter is enabled. At the start, the inverter will impose the reference speed, creating a voltage ramp with time defined in P0331.
- The parameter P0332 sets the minimum time the inverter waits before restarting the motor after the line recovery in Ride-Through. This time is counted from the line voltage drop, and it is necessary for the motor de-magnetizing.
- P0332 is also used at the start with Flying Start, before the beginning of the Flying Start. Set this time (P0332) to twice the rotor constant of the motor.

- The Ride-Through function allows the inverter recovery without DC link undervoltage, when a voltage dip occurs in the supply line.
- The inverter will indicate F0003 (Under Voltage / Phase Loss) if the voltage dip lasts longer than P0332 + P0333 seconds. If the drive is performing the pre-charge procedure, this time will be extended until the completion of the process.
- If Ride-Through is enabled and a voltage dip occurs, causing the DC link to drop below the undervoltage level, the output pulses are disabled and the motor coasts. If the line supply returns to its normal value, the inverter enables the pulses again, imposing the speed of the reference instantaneously (as in the Flying Start function) and applying a voltage ramp with the time defined in P0331. Refer to the Figure 5.42 on page 5-76. The Flying Start function does not work when P0202 = 3 or 4.
- During the Ride-Through, the input cubicle is opened and the pre-charge system is activated.



(a) *Line returns before the time set in P0332*



(b) *Line returns after the time set in P0332, but before the time set P0332+P0333*

Figure 5.42: *(a) and (b) Actuation of the Ride-Through in V/f mode*

P0400 - Motor rated voltage			
Adjustable range:	1 to 9999 V	Factory setting:	4160 V

Description:

- Set according to the motor nameplate data and the connection diagram used in the terminal box.
- This parameter changes the inverter output voltage by applying a gain according to the relationship P0400/P0296 to the values defined by the V/f curves of the control mode chosen (P0202) and of the torque boost set (P0136 and P0137) This gain is added when P0202 = 0, 1 or 2.
- See Figure 5.7 on page 5-21 to Figure 5.9 on page 5-21 .

NOTE!
The motor output voltage (P0400) must be lower than or equal to the inverter voltage (P0296).

NOTE!
This parameter can be changed only with the motor stopped.

P0401 - Motor rated current			
Adjustable range:	0.1 to 6553.5 A	Factory setting:	300.0 A

Description:

- Set according to the motor nameplate data, taking into account the motor voltage.

NOTE!
This parameter can be changed only with the motor stopped.

P0402 - Motor rated speed			
Adjustable range:	1 to 7200 rpm	Factory setting:	1796 rpm

Description:

- Set this parameter according to the motor nameplate data.
- The range for V/f is from 0 to 7200 rpm.

NOTE!
This parameter can be changed only with the motor stopped.

P0403 - Motor Rated Freq			
Adjustable range:	1 to 120 Hz	Factory setting:	60 Hz

Description:

- Set this parameter according to the motor nameplate data.
- The range for V/f is from 1 to 120 Hz.

NOTE!
This parameter can be changed only with the motor stopped.

P0405 - Speed sensor data (encoder)			
Adjustable range:	100 to 9999 PPR	Factory setting:	1024 PPR

Description:

- Program the number of pulses per revolution (ppr) of the used incremental encoder when P0202 = 4 (Encoder).

NOTE!
- This parameter can be changed only with the motor stopped.
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 4 (Encoder).

P0406 - Ventilation Type			
Adjustable range:	0 to 1	Factory setting:	0

Description:

- It sets the overload protection level according to the description of parameters P0156, P0157 and P0158.

Table 5.57: *Ventilation Type*

P0406	Function
0	Self-ventilated
1	Separated ventilation

NOTE!
This parameter can be changed only with the motor stopped.

P0407 - Nominal PF			
Adjustable range:	0.50 to 1.00	Factory setting:	0.68

Description:

- It is the motor power factor setting, according to the motor nameplate data.
- The inaccurate setting will imply in incorrect calculation of the slip compensation.

NOTE!
This parameter can be changed only with the motor stopped.

P0408 - Run Self-tuning			
Adjustable range:	0 to 1	Factory setting:	1

Description:

- With P0408 = 1 (autogain) the gains of the vector control regulators are automatically recalculated when the motor configuration parameters are changed.

Table 5.58: Run Self-tuning

P0408	Function
0	No
1	Self Gain

NOTE!

- This parameter can be changed only with the motor stopped.
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0409 - Motor stator resistance Rs

Adjustable range:	0.000 to 9.999 Ω	Factory setting:	0.000 Ω

Description:

- It is the value of the motor stator resistance.

NOTE!
This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0410 - Motor magnetization current (Imr)

Adjustable range:	0.0 to 1024.0 A	Factory setting:	0.0 A

Description:

- It is the value of the motor magnetization current.

NOTE!
This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0411 - Motor Flux Leakage Inductance

Adjustable range:	0.00 to 99.99 mH	Factory setting:	0.00 mH

Description:

- It is the value of the motor flux leakage inductance.

NOTE!
This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0412 - Lr/Rr Constant

Adjustable range:	0.000 to 9.999 s	Factory setting:	0.000 s

Description:

- It is the motor rotor time constant (Lr/Rr).

P0413 - Tm Time Constant			
Adjustable range:	0.00 to 99.99 s	Factory setting:	0.00 s

Description:

- It is the mechanical time constant.

NOTE!
This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0414 - Magnetizing voltage			
Adjustable range:	0.0 to 20.0 %	Factory setting:	0.0 %

Description:

- It is a percentage of the nominal voltage applied for (2 x P0412) seconds to ensure the magnetization of the motor before the start.

NOTE!
This parameter is only visible on the HMI when: the control type is scalar, P0202 = 0, 1 or 2 (V/f control).

P0427 - Inductance LD sigma			
Adjustable range:	0.00 to 99.99 mH	Factory setting:	4.85 mH

Description:

- Motor parameter used on the stator flux observer.

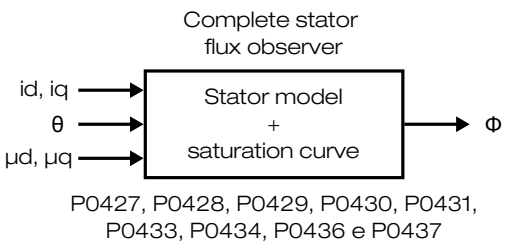


Figure 5.43: *Complete model of the stator flux*

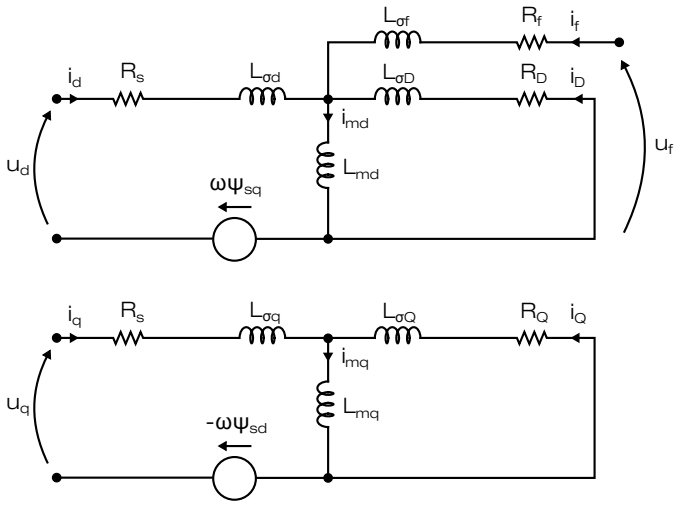


Figure 5.44: *Electrical model of a synchronous motor*

NOTE!

- This parameter is only visible on HMI when: P0950 = 1 (Synchronous motor with brushes) or P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0428 - Inductance LQ sigma			
Adjustable range:	0.00 to 99.99 mH	Factory setting:	4.41 mH

Description:

- Motor parameter used in stator flux model.

NOTE!

- This parameter is only visible on HMI when: P0950 = 1 (Synchronous motor with brushes) or P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0429 - Resistence RD			
Adjustable range:	0.000 to 9.999 Ω	Factory setting:	1.139 Ω

Description:

- Motor parameter used in the stator flux model.

NOTE!

- This parameter is only visible on HMI when: P0950 = 1 (Synchronous motor with brushes) or P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0430 - Resistance RQ			
Adjustable range:	0.000 to 9.999 Ω	Factory setting:	0.831 Ω

Description:

- Motor parameter used in the stator flux model.

NOTE!

- This parameter is only visible on HMI when: P0950 = 1 (Synchronous motor with brushes) or P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0431 - Number of motor poles			
Adjustable range:	2 to 64	Factory setting:	4

Description:

- Number of motor poles.
- Determined by:

$$\text{Number of poles} = \frac{120 \times \text{frequency}_{\text{rated}}}{\text{rpm}_{\text{rated}}}$$

NOTE!
This parameter is only visible on the HMI when: P0950 > 0.

P0433 - Inductance Lq			
Adjustable range:	0.0 to 999.9 mH	Factory setting:	45.7 mH

Description:

- Stator LQ inductance of the synchronous motor.

NOTE!

- This parameter is only visible on HMI when: P0950 = 1 (Synchronous motor with brushes) or P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0434 - Inductance Ld			
Adjustable range:	0.0 to 999.9 mH	Factory setting:	86.9 mH

Description:

- Stator LD inductance of the synchronous motor.

NOTE!

- This parameter is only visible on HMI when: P0950 = 1 (Synchronous motor with brushes) or P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0436 - Inductance Lf			
Adjustable range:	0.0 to 999.9 mH	Factory setting:	88.0 mH

Description:

- LF field inductance of the synchronous motor.

NOTE!

- This parameter is only visible on HMI when: P0950 = 1 (Synchronous motor with brushes) or P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0437 - Resistence Rf			
Adjustable range:	0.000 to 9.999 Ω	Factory setting:	0.047 Ω

Description:

- Field resistance of the synchronous motor.

NOTE!

- This parameter is only visible on HMI when: P0950 = 1 (Synchronous motor with brushes) or P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0438 - Proportional gain of current reg. IQ			
Adjustable range:	0.000 to 9.999	Factory setting:	0.034

Description:

- Parameter used by the regulator to control the currents.

Figure 5.45: *Complete model of the stator flux*

NOTE!

- This parameter is only visible on HMI when: P0950 = 1 (Synchronous motor with brushes) or P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0439 - Integration constant of current reg. IQ

Adjustable range:	0.1 to 999.9	Factory setting:	9.0

Description:

- Parameter used by the regulator to control the currents.

NOTE!

- This parameter is only visible on HMI when: P0950 = 1 (Synchronous motor with brushes) or P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0440 - Proportional gain of current reg. ID

Adjustable range:	0.000 to 9.999	Factory setting:	0.074

Description:

- Parameter used by the regulator to control the currents.

NOTE!

- This parameter is only visible on HMI when: P0950 = 1 (Synchronous motor with brushes) or P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0441 - Integration constant of current reg. ID

Adjustable range:	0.1 to 999.9	Factory setting:	19.6

Description:

- Parameter used by the regulator to control the currents.

NOTE!

- This parameter is only visible on HMI when: P0950 = 1 (Synchronous motor with brushes) or P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0442 - Prop. Gain If			
Adjustable range:	0.000 to 9.999	Factory setting:	0.788

Description:

- The brushless exciter current regulator has as reference the field current required by the control, and as feedback, the estimated current, based on the exciter parameters.
- P0444 and P0445 define the maximum and minimum limits of the regulator output.
- The maximum voltage value that can be applied to the exciter can be calculated as:

$$V_{exc,max} = P0444 \times V_{converter\ exciter} \times k_{transformer}$$

Where:
$V_{converter\ exciter}$ is the voltage of the converter used to supply the exciter.
$k_{transformer}$ is the gain of the transformer, if a transfrm is used in this circuit.

NOTE!

- This parameter is only visible on the HMI when: P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0443 - Field I Const			
Adjustable range:	1 to 9999	Factory setting:	703

Description:

- Function not implemented in this software version.

NOTE!

- This parameter is only visible on the HMI when: P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0444 - Maximum Uf			
P0445 - Minimum Uf			
Adjustable range:	0.01 to 1.00 PU	Factory setting:	P0444 = 0.58 PU P0445 = 0.01 PU

Description:

- Function not implemented in this software version.

NOTE!

- This parameter is only visible on the HMI when: P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0446 - Base field current			
Adjustable range:	0.1 to 999.9 A	Factory setting:	33.3 A

Description:

- Current base used for the field current.

NOTE!

- This parameter is only visible on HMI when: P0950 = 1 (Synchronous motor with brushes) or P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0447 - Proportional gain of the field regulator			
Adjustable range:	0.000 to 9.999	Factory setting:	0.087

Description:

- PI (integrator proportional) gain used in the reference of the field regulator.

NOTE!
This parameter is only visible on the HMI when: P0950 > 0.

P0448 - Integration constant of the field regulator			
Adjustable range:	1 to 9999	Factory setting:	70

Description:

- PI (integrator proportional) gain used in the reference of the field regulator.

NOTE!
This parameter is only visible on the HMI when: P0950 > 0.

P0449 - Maximum field current (Brushless)			
Adjustable range:	0.00 to 5.00 PU	Factory setting:	0.70 PU

Description:

- Maximum limit in PU of P0462 used in the control of the field current reference; see Section 5.2 FIELD EXCITATION SET (DC WITH BRUSHES) on page 5-3 of the User's Manual.
- Set according to the possible overload on the inverter/exciter.

NOTE!
This parameter is only visible on the HMI when: P0950 > 0.

P0450 - Minimum field current (Brushless)			
Adjustable range:	0.00 to 5.00 PU	Factory setting:	0.01 PU

Description:

- Minimum limit in PU of P0462 used in the control of the field current reference, see Section 5.2 FIELD EXCITATION SET (DC WITH BRUSHES) on page 5-3 of the User's Manual.
- Minimum field for frequency higher than P0452.

NOTE!
This parameter is only visible on the HMI when: P0950 > 0.

P0451 - Minimum field for soft-start function			
Adjustable range:	0.01 to 5.00 PU	Factory setting:	0.15 PU

Description:

- Minimum limit in PU of P0462 used in the control of the field current reference, see Section 5.2 FIELD EXCITATION SET (DC WITH BRUSHES) on page 5-3 of the User's Manual.
- Minimum field for frequency lower than or equal to P0452.
- Used in the soft-start function without rotor orientation in scalar mode.

NOTE!
Function used in motor without encoder.

NOTE!

- This parameter is only visible on HMI when: P0950 = 1 (Synchronous motor with brushes) or P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is scalar, P0202 = 0, 1 or 2 (V/f control).

P0452 - Field input frequency			
Adjustable range:	0.0 to 60.0 Hz	Factory setting:	0.0 Hz

Description:

- Input frequency of the field excitation in scalar mode used in the soft-start function without rotor orientation.

NOTE!

- In scalar mode without encoder, the motor must "match" the inverter, and it is not possible to start motors with currents higher than the inverter current.
- When encoder is used, this parameter must be set to 0 Hz, disabling the soft-start without encoder function.
- For further information, contact WEG Technical Assistance.

WARNING!
For encoder setting:

- Set parameter P0452 (Field input frequency) to 0 Hz.
- Control Type (P0202) must be scalar and the direction of rotation forward; configure one of the analog outputs for the encoder setting (E.g.: P0656 = [018] (EncAdjMS).

NOTE!

- This parameter is only visible on the HMI when: P0950 > 0.
- This parameter is only visible on the HMI when: the control type is scalar, P0202 = 0, 1 or 2 (V/f control).

P0453 - Field ramp time			
Adjustable range:	0.00 to 30.00 s	Factory setting:	1.00 s

Description:

- Field ramp time in seconds, used in the field regulator reference.
- Used in the field soft-start.

NOTE!

- This parameter is only visible on HMI when: P0950 = 1 (Synchronous motor with brushes) or P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is scalar, P0202 = 0, 1 or 2 (V/f control).

P0454 - Poly A1 magnetic saturation curve			
P0455 - Poly B1 magnetic saturation curve			
P0456 - Poly C1 magnetic saturation curve			
Adjustable range:	P0454 = -9.999 to 9.999 P0455 = 0.000 to 9.999 P0456 = 0.000 to 9.999	Factory setting:	P0454 = 0.000 P0455 = 0.174 P0456 = 1.059

Description:

- Coefficient of the polynomial of the magnetic saturation curve.
- The machine operates with linear flux up to the point in which the linear curve follows the saturation curve; from this point the machine flux follows a mathematical model obtained from the data of the motor manufacturer.

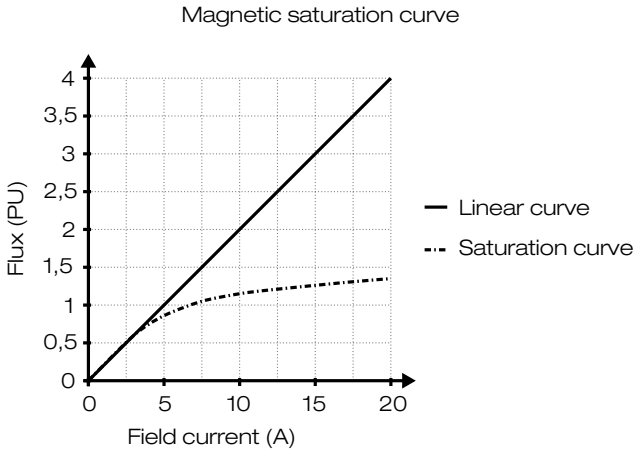


Figure 5.46: *Typical saturation curve and mathematical approximations used by the inverter for flux control*

NOTE!
For further information, contact WEG Technical Assistance.

NOTE!

- This parameter is only visible on HMI when: P0950 = 1 (Synchronous motor with brushes) or P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0457 - Poly a2 Exc			
P0458 - Poly b2 Exc			
P0459 - Poly c2 Exc			
Adjustable range:	P0457 = 0.000 to 9.999 P0458 = 0.000 to 9.999 P0459 = 0.0 to 999.9	Factory setting:	P0457 = 0.185 P0458 = 0.068 P0459 = 118.7

Description:

- The brushless motor exciter polynomial describes the voltage variation at the field winding terminals of the synchronous machine as a function of the voltage applied to the exciter primary terminals.
- The A2 coefficient is multiplied by 10^{-4}.
- See the motor documentation to obtain the polynomial coefficients.

NOTE!

- This parameter is only visible on the HMI when: P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0460 - R Field n Stator			
Adjustable range:	0.000 to 9.999 Ω	Factory setting:	1.150 Ω

Description:

- Electrical resistance of the field winding.

NOTE!

- This parameter is only visible on the HMI when: P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0461 - I Field Brushl.			
Adjustable range:	0.1 to 999.9 A	Factory setting:	25.6 A

Description:

- Field current required to maintain the unit power factor, with voltage from the stator terminals at the rated voltage of the machine and without load on the shaft, at rated speed.

NOTE!

- This parameter is only visible on the HMI when: P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0462 - Field current scale			
P0463 - Exciter rated voltage scale			
Adjustable range:	P0462 = 0.1 to 999.9 A P0463 = 0 to 9999 V	Factory setting:	P0462 = 94.0 A P0463 = 380 V

Description:

- It sets the full scale of the field current regulation action of synchronous machines in vector control.
- For synchronous machines with brushes, this value must be defined as the rated current of the converter that feeds the field.
- For synchronous machines with AC excitation, check the excitation curves of the machine and use the rated load starting current and unit power factor, adding a margin of 20% of the value.

NOTE!
This parameter is only visible on the HMI when: P0950 = 2 (Brushless synchronous motor).

P0464 - Maximum compensation current of PF			
Adjustable range:	0.00 to 1.00 PU	Factory setting:	0.80 PU

Description:

- Maximum compensation current, in PU, of the power factor.

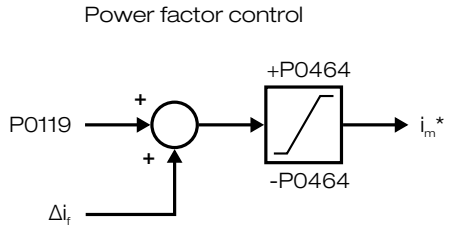


Figure 5.47: *Block diagram of the power factor control*

NOTE!

- This parameter is only visible on HMI when: P0950 = 1 (Synchronous motor with brushes) or P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

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P0465 - Excit. Delay			
Adjustable range:	0.000 to 9.999 s	Factory setting:	0.000 s

Description:

- Delay in seconds applied to the field used in the speed control of the synchronous machine.

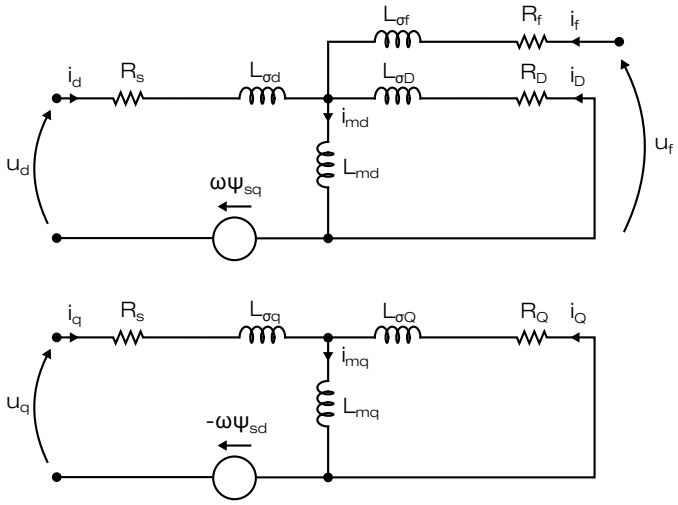

Figure 5.48: *Electrical model of a synchronous motor*

Table 5.59: *Motor output parameters*

Parameter	Unit	Description
P0427	mH	Inductance LDσ
P0428	mH	Inductance LQσ
P0429	Ω	Resistance RD
P0430	Ω	Resistance RQ
P0431	-	Number Poles of the Motor
P0433	mH	Inductance LQ
P0434	mH	Inductance LD
P0436	mH	Inductance LF
P0437	Ω	Resistance RF

NOTE!
To determine P0427 ... P0437 contact WEG Technical Assistance.

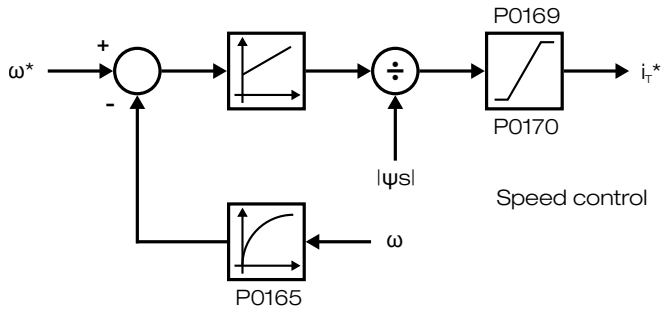

Figure 5.49: *Block diagram of the speed control*

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NOTE!

- This parameter is only visible on the HMI when: P0950 = 2 (Brushless synchronous motor).
- This parameter is only visible on the HMI when: the control type is vector, P0202 = 3 (Sensorless) or P0202 = 4 (Encoder).

P0468 - PM Gain			
Adjustable range:	0.000 to 9.999	Factory setting:	0.000

Description:

- Sets the maximum torque per ampere or maximum efficiency gain.

It can be calculated as follows:

$$\Phi = \frac{K_e}{2\pi} 60$$

$$P0468 = \Gamma_e = \frac{L_s}{\Phi} P0295$$

Being:
L_s = Stator Inductance
Φ = Rotor flux
P0295 = Inverter rated current
K_e = Electrical constant $[V_{rms}/rpm](fase)$

NOTE!

- This parameter is only visible on the HMI when: P0950 = 3 (Permanent magnet synchronous motor).
- This parameter is only visible on the HMI when: the control type is scalar, P0202 = 0, 1 or 2 (V/f control).

P0491 - Graphic HMI Cfg.			
Adjustable range:	0 to 2	Factory setting:	0

Description:

- It configures the origin of the inverter Local or Remote (LOC/REM) commands for 'Serial' type, so that the Graphic HMI will be able to operate properly (the Graphic HMI commands are of the Modbus RTU serial type).

Table 5.60: *Graphic HMI Cfg.*

P0491	Function
0	Inactive
1	Local HMI
2	Remote HMI

NOTE!
This parameter can be changed only with the motor stopped.

P0498 - Force trigger			
Adjustable range:	0 to 1	Factory setting:	0

Description:

- In the transition to active, the trigger event occurs.
- Configure P0552 = 21.

Table 5.61: *Force trigger*

P0498	Function
0	Off
1	On

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0499 - Trace time	
Resolution:	0.1 s

Description:

- It indicates the total time of the trace function.

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0520 - PID proportional gain			
P0521 - PID integral gain			
P0522 - PID differential gain			
P0523 - PID Ramp Time			
Adjustable range:	P0520 = 0.000 to 7.999 P0521 = 0.000 to 9.999 P0522 = 0.000 to 9.999 P0523 = 0.0 to 999.0 s	Factory setting:	P0520 = 1.000 P0521 = 1.000 P0522 = 0.000 P0523 = 3.0 s

Description:

- Some examples of initial settings for the PID Regulator and Ramp Time for some applications mentioned in Section 6.2 PID REGULATOR on page 6-4 are shown in Table 5.62 on page 5-94.

Table 5.62: *PID initial gain setting suggestions*

Process Variable	Gains			Time PID Ramp P0523	Type of action P0527
	Proportional P0520	Integral P0521	Differential P0522		
Pneumatic system pressure	1	0.043	0.0	3	0 = No
Pneumatic system flow	1	0.037	0.0	3	0 = No
Hydraulic system pressure	1	0.043	0.0	3	0 = No
Hydraulic system flow	1	0.037	0.0	3	0 = No
Temperature	2	0.004	0.0	3	See Note
Level	1	See note	0.0	3	See note

Note:

- For temperature and level, the action type setting will depend on the process. For level control, for instance, if the inverter drives the motor that pumps fluid out of the reservoir, the action will be reverse because when the level increases the inverter must increase the motor speed in order to lower the level, otherwise, when the inverter drives a motor that pumps fluid into the reservoir, the action will be direct.
- In case of level control, the integral gain adjustment will depend on the time required for the reservoir to pass from the minimum acceptable to the desired level, in the following conditions:
  1. For direct action, the time must be measured with maximum input flow and minimum output flow.
  2. For reverse action, the time must be measured with minimum input flow and maximum output flow.

An equation to calculate an initial value for P0521 (PID integral gain) as a function of the system response time, is presented below:

$$P0521 = \frac{0.02}{t}$$

t = time (seconds)

NOTE!
This parameter is only visible on the HMI when: the PID function is active, P0203 = 1 (PID Reg.) or P0203 = 3 (Trace+PID).

P0524 - PID feedback selection			
Adjustable range:	0 to 1	Factory setting:	0

Description:

- It selects the regulator feedback (Process Variable) input.
- After the feedback input has been chosen, the function of the selected input must be programmed at P0237 (for AI2) or P0241 (for AI3).
- Feedback type:
  - The PID action type described above considers that the process variable feedback signal increases when the process variable also increases (direct feedback). This is the most used feedback type.
  - If the process variable feedback decreases as the process variable increases (inverse feedback), then it is necessary to program the analog input selected for the PID feedback (AI2 or AI3) as inverse reference: P0239 = 2 (10 to 0 V/20 to 0 mA) or 3 (20 to 4 mA) for AI2 feedback and P0243 = 2 (10 to 0 V/20 to 0 mA) or 3 (20 to 4 mA) for AI3 feedback. Without this setting, the PID does not operate correctly.

Table 5.63: *PID feedback selection*

P0524	Function
0	AI2 (P237)
1	AI3 (P241)

NOTE!

- This parameter is only visible on the HMI when: the PID function is active, P0203 = 1 (PID Reg.) or P0203 = 3 (Trace+PID).
- This parameter can be changed only with the motor stopped.

P0525 - PID regulator setpoint			
Adjustable range:	0.0 to 100.0 %	Factory setting:	0.0 %

Description:

- It provides the setpoint that is adjusted via the and keys for the PID regulator (P0203 = 1 or 3), provided that P0221 = 0 (Local) or P0222 = 0 (Remote) and in automatic mode. If the PID is in manual mode, then the reference by keys is given by P0121.
- When the PID regulator is operating in automatic mode, the setpoint is via reference adjusted with P0221 (Local) or P0222 (Remote). Most PID applications either use setpoint via analog input AI1 [P0221 = 1 (Local) or P0222 = 1 (Remote) ou via and keys [P0221 = 0 (Local) or P0222 = 0 (Remote).
- Refer to Section 6.2 PID REGULATOR on page 6-4 .

NOTE!
This parameter is only visible on the HMI when: the PID function is active, P0203 = 1 (PID Reg.) or P0203 = 3 (Trace+PID).

P0526 - Process variable filter			
Adjustable range:	0.0 to 16.0 s	Factory setting:	0.1 s

Description:

- It adjusts time constant of the process variable filter.

- The 0.1 s value is usually adequate, unless the process variable presents much noise. In such case, increase the value gradually, observing the result.

NOTE!
This parameter is only visible on the HMI when: the PID function is active, P0203 = 1 (PID Reg.) or P0203 = 3 (Trace+PID).

P0527 - Error Value Inv

Adjustable range:	0 to 1	Factory setting:	0

Description:

- It defines the type of control action.
- Select according to the process.

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Table 5.64: Selection of operation

Motor speed	Process variable	Select
Increases	Increases	Direct
	Decreases	Reverse

- Process necessity:
  - PID action type: the PID action must be selected as “Direct” when it is necessary to increase the motor speed in order to increase the process variable. Otherwise, select “Reverse”.
    Example 1 - Direct: The inverter drives a pump responsible for filling a reservoir using the PID to control the level. For the level (process variable) to increase, it is necessary that the flow, and consequently the motor speed, also increases.
    Example 2 - Reverse: The inverter drives a fan responsible for cooling a cooling tower using the PID to control the temperature. In order to increase the temperature (process variable), it is necessary to decrease the ventilation by decreasing the motor speed.

Table 5.65: Error Value Inv

P0527	Function
0	No
1	Yes

NOTE!
This parameter is only visible on the HMI when: the PID function is active, P0203 = 1 (PID Reg.) or P0203 = 3 (Trace+PID).

P0528 - Process variable scale factor
P0529 - Process Variable Decimal Point

Adjustable range:	P0528 = 0 to 9999 P0529 = 0 to 3	Factory setting:	P0528 = 1000 P0529 = 1

Description:

- P0528 and P0529 define how P0040 (Value of process variable (PID)) will be displayed.
- P0529 defines the number of digits after the decimal point.

- P0528 must be adjusted according to the equation below:

$$P0528 = \frac{\text{Process F.S.V. indication} \times (10)^{P0529}}{\text{Gain (AI2 or AI3)}}$$

Being:
Process F.S.V. indication: process variable full-scale value, corresponding to 10 V (20 mA) at the Analog Input (AI2 or AI3) used as feedback.

Example 1 (Bar Pressure Transducer 0 to 25 bar - output 4 to 20 mA):
- Desired indication: 0 to 25 bar (Process F.S.V).
- Feedback input: AI3.
- Gain AI3 = P0242 = 1.000.
- Signal AI3 = P0243 = 1 (4 to 20 mA).
- P0529 = 0 (no positions after the decimal point).

$$P0528 = \frac{25 \times (10)^{0}}{1.000} = 25$$

Example 2 (factory default settings):
- Desired indication: 0.0 % to 100 % (Process F.S.V).
- Feedback input: AI2.
- Gain AI2 = P0238 = 1.000.
- P0529 = 1 (one position after the decimal point).

$$P0528 = \frac{100.0 \times (10)^{1}}{1.000} = 1000$$

NOTE!
This parameter is only visible on the HMI when: the PID function is active, P0203 = 1 (PID Reg.) or P0203 = 3 (Trace+PID).

P0533 - Process variable X value			
P0534 - Process variable Y value			
P0535 - Output N = 0 PID			
Adjustable range:	P0533 = 0.0 to 100.0 % P0534 = 0.0 to 100.0 % P0535 = 0 to 100 %	Factory setting:	P0533 = 90.0 % P0534 = 10.0 % P0535 = 0 %

Description:

- Used with the digital and relay output functions:
  V. Pr. > VPx and V. Pr. < VPy with the function of signal/alarm.

- The process variable full scale value in percentage is:

$$P0040 = \frac{(10)^{P0529}}{P0528} \times 100\ \%$$

- P0535 works together with P0212 (Condition for disab. output by zero speed), giving an additional condition to leave the disabled condition, that is, PID error > P0535. Refer to parameters P0211 to P0213.

NOTE!
This parameter is only visible on the HMI when: the PID function is active, P0203 = 1 (PID Reg.) or P0203 = 3 (Trace+PID).

P0536 - P0525 Automatic Setting			
Adjustable range:	0 to 1	Factory setting:	0

Description:

- When PID regulator setpoint is via HMI (P0221/P0222 = 13) and P0536 is set to 1 (On), when switching from manual to automatic the process variable value (P0040) will be loaded in P0525. This avoids PID oscillations in manual to automatic switching.

Table 5.66: *P0525 Automatic Setting*

P0536	Function
0	Off
1	On

NOTE!
This parameter is only visible on the HMI when: the PID function is active, P0203 = 1 (PID Reg.) or P0203 = 3 (Trace+PID).

P0550 - Trigger parameter			
Adjustable range:	0 to 999	Factory setting:	0

Description:

- It selects which process variable will be used as trigger source for Trace Function.
- To use the status of digital inputs or outputs as a trigger parameter, set the corresponding bit in P0552 (Trigger condition).

Table 5.67: Trigger parameter

P0550	Function
0	Inativo
1	Motor speed reference
2	Motor Speed
3	Motor Current
4	DC Link Voltage
5	Motor Frequency
6	VFD Status
7	Motor Voltage
8	Motor Torque
9	Inverter output power
10	Inverter Current
11	Digital inputs DI1 to DI10 status
12	Digital outputs DO1 to RL5 status
13	Iv current
14	Iw current
15	Iu current
16	Input AI5
17	Value of process variable (PID)
18	Active redundant ventilation set
19	Junction temperature
20	Phase UAp temperature
21	Phase VAp temperature
22	Phase WAp temperature
23	BRAp Phase temperature
24	Rectifier 1p temperature
25	DC Link N Volt.
26	DC Link P Volt.
27	Phase U temperature
28	Phase V temperature
29	Phase W temperature
30	BR Phase temperature
31	Rectifier temperature
32	Status of DIs MVC3 DI1, DI2, ..., DI16
33	Status of the MVC3 DOs RL1 to RL8
34	Vab Voltage
35	Vcb Voltage
36	Voltage in the transformer secondary
37	MP-GND Voltage
38	i x t Overload
39	Motor field current
40	Excit. Voltage
41	Phase UB temperature
42	Phase VB temperature
43	Phase WB temperature
44	Phase UBp temperature
45	Phase VBp temperature
46	Phase WBp temperature
47	Rectifier 2 temperature
48	Rectifier 3 temperature
49	V DC Link N
50	V DC Link P
51	W DC Link N
52	W DC Link P

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0551 - Trigger value			
Adjustable range:	-32768 to 32767	Factory setting:	0

Description:

- The value programmed in P0551 is compared to the contents of the parameter defined at P0550.
- If the trigger condition is fulfilled, the Trace function will be triggered.

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0552 - Trigger condition			
Adjustable range:	0 to 21	Factory setting:	4

Description:

- Trigger condition of the trace function.

Table 5.68: *Trigger condition*

P0552	Function
0	Value =
1	Value <>
2	Value >
3	Value <
4	Fault
5	Bit 0
6	Bit 1
7	Bit 2
8	Bit 3
9	Bit 4
10	Bit 5
11	Bit 6
12	Bit 7
13	Bit 8
14	Bit 9
15	Bit 10
16	Bit 11
17	Bit 12
18	Bit 13
19	Bit 14
20	Bit 15
21	Force trigger

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0553 - Sampling time			
Adjustable range:	1 to 9999 x 500 µs	Factory setting:	4 x 500 µs

Description:

- It is the trace channels sampling time (as a multiplier of the 500 µs time base).

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0554 - Pre-trigger			
Adjustable range:	0 to 100 %	Factory setting:	50 %

Description:

- It is the percentage of trace data before the trigger event that has to be recorded.

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0555 - CH1: Parameter			
Adjustable range:	0 to 964	Factory setting:	2

Description:

- Parameter that will be recorded by the Trace function at the respective channel.

Table 5.69: CH1: Parameter

P0555	Function
0	Inativo
1	Motor speed reference
2	Motor Speed
3	Motor Current
4	DC Link Voltage
5	Motor Frequency
6	VFD Status
7	Motor Voltage
8	Motor Torque
9	Inverter output power
10	Inverter Current
11	Digital inputs DI1 to DI10 status
12	Digital outputs DO1 to RL5 status
13	Iv current
14	Iw current
15	Iu current
16	Input AI5
17	Value of process variable (PID)
18	Active redundant ventilation set
19	Junction temperature
20	Phase UAp temperature
21	Phase VAp temperature
22	Phase WAp temperature
23	BRAp Phase temperature
24	Rectifier 1p temperature
25	DC Link N Volt.
26	DC Link P Volt.
27	Phase U temperature
28	Phase V temperature
29	Phase W temperature
30	BR Phase temperature
31	Rectifier temperature
32	Status of DIs MVC3 DI1, DI2, ..., DI16
33	Status of the MVC3 DOs RL1 to RL8
34	Vab Voltage
35	Vcb Voltage
36	Voltage in the transformer secondary
37	MP-GND Voltage
38	i x t Overload
39	Motor field current
40	Excit. Voltage
41	Phase UB temperature
42	Phase VB temperature
43	Phase WB temperature
44	Phase UBp temperature
45	Phase VBp temperature
46	Phase WBp temperature
47	Rectifier 2 temperature
48	Rectifier 3 temperature
49	V DC Link N
50	V DC Link P
51	W DC Link N
52	W DC Link P

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0556 - CH1: Mask			
Adjustable range:	0 to 16	Factory setting:	0

Description:

- Define the record manner of the respective channel during trace acquisition.

Table 5.70: *CH1: Mask*

P0556	Function
0	None
1	Bit 0
2	Bit 1
3	Bit 2
4	Bit 3
5	Bit 4
6	Bit 5
7	Bit 6
8	Bit 7
9	Bit 8
10	Bit 9
11	Bit 10
12	Bit 11
13	Bit 12
14	Bit 13
15	Bit 14
16	Bit 15

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0557 - CH2: Parameter			
Adjustable range:	0 to 964	Factory setting:	3

Description:

- Parameter that will be recorded by the Trace function at the respective channel.

Table 5.71: CH2: Parameter

P0557	Function
0	Inativo
1	Motor speed reference
2	Motor Speed
3	Motor Current
4	DC Link Voltage
5	Motor Frequency
6	VFD Status
7	Motor Voltage
8	Motor Torque
9	Inverter output power
10	Inverter Current
11	Digital inputs DI1 to DI10 status
12	Digital outputs DO1 to RL5 status
13	Iv current
14	Iw current
15	Iu current
16	Input AI5
17	Value of process variable (PID)
18	Active redundant ventilation set
19	Junction temperature
20	Phase UAp temperature
21	Phase VAp temperature
22	Phase WAp temperature
23	BRAp Phase temperature
24	Rectifier 1p temperature
25	DC Link N Volt.
26	DC Link P Volt.
27	Phase U temperature
28	Phase V temperature
29	Phase W temperature
30	BR Phase temperature
31	Rectifier temperature
32	Status of DIs MVC3 DI1, DI2, ..., DI16
33	Status of the MVC3 DOs RL1 to RL8
34	Vab Voltage
35	Vcb Voltage
36	Voltage in the transformer secondary
37	MP-GND Voltage
38	i x t Overload
39	Motor field current
40	Excit. Voltage
41	Phase UB temperature
42	Phase VB temperature
43	Phase WB temperature
44	Phase UBp temperature
45	Phase VBp temperature
46	Phase WBp temperature
47	Rectifier 2 temperature
48	Rectifier 3 temperature
49	V DC Link N
50	V DC Link P
51	W DC Link N
52	W DC Link P

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0558 - CH2: Mask			
Adjustable range:	0 to 16	Factory setting:	0

Description:

- Define the record manner of the respective channel during trace acquisition.

Table 5.72: *CH2: Mask*

P0558	Function
0	None
1	Bit 0
2	Bit 1
3	Bit 2
4	Bit 3
5	Bit 4
6	Bit 5
7	Bit 6
8	Bit 7
9	Bit 8
10	Bit 9
11	Bit 10
12	Bit 11
13	Bit 12
14	Bit 13
15	Bit 14
16	Bit 15

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0559 - CH3: Parameter			
Adjustable range:	0 to 964	Factory setting:	4

Description:

- Parameter that will be recorded by the Trace function at the respective channel.

Table 5.73: CH3: Parameter

P0559	Function
0	Inativo
1	Motor speed reference
2	Motor Speed
3	Motor Current
4	DC Link Voltage
5	Motor Frequency
6	VFD Status
7	Motor Voltage
8	Motor Torque
9	Inverter output power
10	Inverter Current
11	Digital inputs DI1 to DI10 status
12	Digital outputs DO1 to RL5 status
13	Iv current
14	Iw current
15	Iu current
16	Input AI5
17	Value of process variable (PID)
18	Active redundant ventilation set
19	Junction temperature
20	Phase UAp temperature
21	Phase VAp temperature
22	Phase WAp temperature
23	BRAp Phase temperature
24	Rectifier 1p temperature
25	DC Link N Volt.
26	DC Link P Volt.
27	Phase U temperature
28	Phase V temperature
29	Phase W temperature
30	BR Phase temperature
31	Rectifier temperature
32	Status of DIs MVC3 DI1, DI2, ..., DI16
33	Status of the MVC3 DOs RL1 to RL8
34	Vab Voltage
35	Vcb Voltage
36	Voltage in the transformer secondary
37	MP-GND Voltage
38	i x t Overload
39	Motor field current
40	Excit. Voltage
41	Phase UB temperature
42	Phase VB temperature
43	Phase WB temperature
44	Phase UBp temperature
45	Phase VBp temperature
46	Phase WBp temperature
47	Rectifier 2 temperature
48	Rectifier 3 temperature
49	V DC Link N
50	V DC Link P
51	W DC Link N
52	W DC Link P

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0560 - CH3: Mask			
Adjustable range:	0 to 16	Factory setting:	0

Description:

- Define the record manner of the respective channel during trace acquisition.

Table 5.74: *CH3: Mask*

P0560	Function
0	None
1	Bit 0
2	Bit 1
3	Bit 2
4	Bit 3
5	Bit 4
6	Bit 5
7	Bit 6
8	Bit 7
9	Bit 8
10	Bit 9
11	Bit 10
12	Bit 11
13	Bit 12
14	Bit 13
15	Bit 14
16	Bit 15

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0561 - CH4: Parameter			
Adjustable range:	0 to 964	Factory setting:	5

Description:

- Parameter that will be recorded by the Trace function at the respective channel.

Table 5.75: CH4: Parameter

P0561	Function
0	Inativo
1	Motor speed reference
2	Motor Speed
3	Motor Current
4	DC Link Voltage
5	Motor Frequency
6	VFD Status
7	Motor Voltage
8	Motor Torque
9	Inverter output power
10	Inverter Current
11	Digital inputs DI1 to DI10 status
12	Digital outputs DO1 to RL5 status
13	Iv current
14	Iw current
15	Iu current
16	Input AI5
17	Value of process variable (PID)
18	Active redundant ventilation set
19	Junction temperature
20	Phase UAp temperature
21	Phase VAp temperature
22	Phase WAp temperature
23	BRAp Phase temperature
24	Rectifier 1p temperature
25	DC Link N Volt.
26	DC Link P Volt.
27	Phase U temperature
28	Phase V temperature
29	Phase W temperature
30	BR Phase temperature
31	Rectifier temperature
32	Status of DIs MVC3 DI1, DI2, ..., DI16
33	Status of the MVC3 DOs RL1 to RL8
34	Vab Voltage
35	Vcb Voltage
36	Voltage in the transformer secondary
37	MP-GND Voltage
38	i x t Overload
39	Motor field current
40	Excit. Voltage
41	Phase UB temperature
42	Phase VB temperature
43	Phase WB temperature
44	Phase UBp temperature
45	Phase VBp temperature
46	Phase WBp temperature
47	Rectifier 2 temperature
48	Rectifier 3 temperature
49	V DC Link N
50	V DC Link P
51	W DC Link N
52	W DC Link P

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0562 - CH4: Mask			
Adjustable range:	0 to 16	Factory setting:	0

Description:

- Define the record manner of the respective channel during trace acquisition.

Table 5.76: *CH4: Mask*

P0562	Function
0	None
1	Bit 0
2	Bit 1
3	Bit 2
4	Bit 3
5	Bit 4
6	Bit 5
7	Bit 6
8	Bit 7
9	Bit 8
10	Bit 9
11	Bit 10
12	Bit 11
13	Bit 12
14	Bit 13
15	Bit 14
16	Bit 15

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0563 - CH5: Parameter			
Adjustable range:	0 to 964	Factory setting:	6

Description:

- Parameter that will be recorded by the Trace function at the respective channel.

Table 5.77: CH5: Parameter

P0563	Function
0	Inativo
1	Motor speed reference
2	Motor Speed
3	Motor Current
4	DC Link Voltage
5	Motor Frequency
6	VFD Status
7	Motor Voltage
8	Motor Torque
9	Inverter output power
10	Inverter Current
11	Digital inputs DI1 to DI10 status
12	Digital outputs DO1 to RL5 status
13	Iv current
14	Iw current
15	Iu current
16	Input AI5
17	Value of process variable (PID)
18	Active redundant ventilation set
19	Junction temperature
20	Phase UAp temperature
21	Phase VAp temperature
22	Phase WAp temperature
23	BRAp Phase temperature
24	Rectifier 1p temperature
25	DC Link N Volt.
26	DC Link P Volt.
27	Phase U temperature
28	Phase V temperature
29	Phase W temperature
30	BR Phase temperature
31	Rectifier temperature
32	Status of DIs MVC3 DI1, DI2, ..., DI16
33	Status of the MVC3 DOs RL1 to RL8
34	Vab Voltage
35	Vcb Voltage
36	Voltage in the transformer secondary
37	MP-GND Voltage
38	i x t Overload
39	Motor field current
40	Excit. Voltage
41	Phase UB temperature
42	Phase VB temperature
43	Phase WB temperature
44	Phase UBp temperature
45	Phase VBp temperature
46	Phase WBp temperature
47	Rectifier 2 temperature
48	Rectifier 3 temperature
49	V DC Link N
50	V DC Link P
51	W DC Link N
52	W DC Link P

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0564 - CH5: Mask			
Adjustable range:	0 to 16	Factory setting:	0

Description:

- Define the record manner of the respective channel during trace acquisition.

Table 5.78: *CH5: Mask*

P0564	Function
0	None
1	Bit 0
2	Bit 1
3	Bit 2
4	Bit 3
5	Bit 4
6	Bit 5
7	Bit 6
8	Bit 7
9	Bit 8
10	Bit 9
11	Bit 10
12	Bit 11
13	Bit 12
14	Bit 13
15	Bit 14
16	Bit 15

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0565 - CH6: Parameter			
Adjustable range:	0 to 964	Factory setting:	7

Description:

- Parameter that will be recorded by the Trace function at the respective channel.

Table 5.79: CH6: Parameter

P0565	Function
0	Inativo
1	Motor speed reference
2	Motor Speed
3	Motor Current
4	DC Link Voltage
5	Motor Frequency
6	VFD Status
7	Motor Voltage
8	Motor Torque
9	Inverter output power
10	Inverter Current
11	Digital inputs DI1 to DI10 status
12	Digital outputs DO1 to RL5 status
13	Iv current
14	Iw current
15	Iu current
16	Input AI5
17	Value of process variable (PID)
18	Active redundant ventilation set
19	Junction temperature
20	Phase UAp temperature
21	Phase VAp temperature
22	Phase WAp temperature
23	BRAp Phase temperature
24	Rectifier 1p temperature
25	DC Link N Volt.
26	DC Link P Volt.
27	Phase U temperature
28	Phase V temperature
29	Phase W temperature
30	BR Phase temperature
31	Rectifier temperature
32	Status of DIs MVC3 DI1, DI2, ..., DI16
33	Status of the MVC3 DOs RL1 to RL8
34	Vab Voltage
35	Vcb Voltage
36	Voltage in the transformer secondary
37	MP-GND Voltage
38	i x t Overload
39	Motor field current
40	Excit. Voltage
41	Phase UB temperature
42	Phase VB temperature
43	Phase WB temperature
44	Phase UBp temperature
45	Phase VBp temperature
46	Phase WBp temperature
47	Rectifier 2 temperature
48	Rectifier 3 temperature
49	V DC Link N
50	V DC Link P
51	W DC Link N
52	W DC Link P

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0566 - CH6: Mask			
Adjustable range:	0 to 16	Factory setting:	0

Description:

- Define the record manner of the respective channel during trace acquisition.

Table 5.80: *CH6: Mask*

P0566	Function
0	None
1	Bit 0
2	Bit 1
3	Bit 2
4	Bit 3
5	Bit 4
6	Bit 5
7	Bit 6
8	Bit 7
9	Bit 8
10	Bit 9
11	Bit 10
12	Bit 11
13	Bit 12
14	Bit 13
15	Bit 14
16	Bit 15

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0567 - CH7: Parameter			
Adjustable range:	0 to 964	Factory setting:	8

Description:

- Parameter that will be recorded by the Trace function at the respective channel.

Table 5.81: CH7: Parameter

P0567	Function
0	Inativo
1	Motor speed reference
2	Motor Speed
3	Motor Current
4	DC Link Voltage
5	Motor Frequency
6	VFD Status
7	Motor Voltage
8	Motor Torque
9	Inverter output power
10	Inverter Current
11	Digital inputs DI1 to DI10 status
12	Digital outputs DO1 to RL5 status
13	Iv current
14	Iw current
15	Iu current
16	Input AI5
17	Value of process variable (PID)
18	Active redundant ventilation set
19	Junction temperature
20	Phase UAp temperature
21	Phase VAp temperature
22	Phase WAp temperature
23	BRAp Phase temperature
24	Rectifier 1p temperature
25	DC Link N Volt.
26	DC Link P Volt.
27	Phase U temperature
28	Phase V temperature
29	Phase W temperature
30	BR Phase temperature
31	Rectifier temperature
32	Status of DIs MVC3 DI1, DI2, ..., DI16
33	Status of the MVC3 DOs RL1 to RL8
34	Vab Voltage
35	Vcb Voltage
36	Voltage in the transformer secondary
37	MP-GND Voltage
38	i x t Overload
39	Motor field current
40	Excit. Voltage
41	Phase UB temperature
42	Phase VB temperature
43	Phase WB temperature
44	Phase UBp temperature
45	Phase VBp temperature
46	Phase WBp temperature
47	Rectifier 2 temperature
48	Rectifier 3 temperature
49	V DC Link N
50	V DC Link P
51	W DC Link N
52	W DC Link P

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0568 - CH7: Mask			
Adjustable range:	0 to 16	Factory setting:	0

Description:

- Define the record manner of the respective channel during trace acquisition.

Table 5.82: *CH7: Mask*

P0568	Function
0	None
1	Bit 0
2	Bit 1
3	Bit 2
4	Bit 3
5	Bit 4
6	Bit 5
7	Bit 6
8	Bit 7
9	Bit 8
10	Bit 9
11	Bit 10
12	Bit 11
13	Bit 12
14	Bit 13
15	Bit 14
16	Bit 15

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0569 - CH8: Parameter			
Adjustable range:	0 to 964	Factory setting:	9

Description:

- Parameter that will be recorded by the Trace function at the respective channel.

Table 5.83: CH8: Parameter

P0569	Function
0	Inativo
1	Motor speed reference
2	Motor Speed
3	Motor Current
4	DC Link Voltage
5	Motor Frequency
6	VFD Status
7	Motor Voltage
8	Motor Torque
9	Inverter output power
10	Inverter Current
11	Digital inputs DI1 to DI10 status
12	Digital outputs DO1 to RL5 status
13	Iv current
14	Iw current
15	Iu current
16	Input AI5
17	Value of process variable (PID)
18	Active redundant ventilation set
19	Junction temperature
20	Phase UAp temperature
21	Phase VAp temperature
22	Phase WAp temperature
23	BRAp Phase temperature
24	Rectifier 1p temperature
25	DC Link N Volt.
26	DC Link P Volt.
27	Phase U temperature
28	Phase V temperature
29	Phase W temperature
30	BR Phase temperature
31	Rectifier temperature
32	Status of DIs MVC3 DI1, DI2, ..., DI16
33	Status of the MVC3 DOs RL1 to RL8
34	Vab Voltage
35	Vcb Voltage
36	Voltage in the transformer secondary
37	MP-GND Voltage
38	i x t Overload
39	Motor field current
40	Excit. Voltage
41	Phase UB temperature
42	Phase VB temperature
43	Phase WB temperature
44	Phase UBp temperature
45	Phase VBp temperature
46	Phase WBp temperature
47	Rectifier 2 temperature
48	Rectifier 3 temperature
49	V DC Link N
50	V DC Link P
51	W DC Link N
52	W DC Link P

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0570 - CH8: Mask			
Adjustable range:	0 to 16	Factory setting:	0

Description:

- Define the record manner of the respective channel during trace acquisition.

Table 5.84: *CH8: Mask*

P0570	Function
0	None
1	Bit 0
2	Bit 1
3	Bit 2
4	Bit 3
5	Bit 4
6	Bit 5
7	Bit 6
8	Bit 7
9	Bit 8
10	Bit 9
11	Bit 10
12	Bit 11
13	Bit 12
14	Bit 13
15	Bit 14
16	Bit 15

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0571 - Start trace			
Adjustable range:	0 to 1	Factory setting:	0

Description:

- It programs the trace function and initiating its operation.

Table 5.85: *Start trace*

P0571	Function
0	Off
1	On

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0572 - Trace memory			
Adjustable range:	1 to 100 %	Factory setting:	50 %

Description:

- It defines the percentage of the available memory that will be used for the Trace function recording.

NOTE!
This parameter is only visible on the HMI when: the Trace function is active, P0203 = 2 (Trace) or P0203 = 3 (Trace+PID).

P0621 - Sin. Out. Filter			
Adjustable range:	0 to 2	Factory setting:	0

Description:

- It enables the proper modulation for operation with sinusoidal filter.

Table 5.86: *Sin. Out. Filter*

P0621	Function
0	Inactive
1	Active
2	With Oversample

5

P0622 - End frequency of boost I x R			
Adjustable range:	0 to 9999	Factory setting:	4095

Description:

- It determines the end actuation frequency of the manual torque boost.
- For further information, refer to parameter P0136 (Manual torque boost (I x R)).
- The frequency is determined by the equation below:

$$P0622\ (Hz) = \frac{P0622 \times P0403}{8192}$$

P0629 - Synchronism time			
Adjustable range:	1.0 to 20.0 s	Factory setting:	3.0 s

Description:

- Minimum time the inverter must maintain the phase error between the line voltage and the inverter output voltage smaller than the setting in P0632 (Maximum phase error) so as to signal it as synchronism OK.

P0630 - Synchronism timeout			
Adjustable range:	20 to 240 s	Factory setting:	60 s

Description:

- Time out of synchronism with the line.
- Time counted from the activation of the DI of the MVC4, which starts the search until the signaling of synchronism OK.
- If this time is exceeded, A0008 (Line Sync. Time Out) will be indicated.

P0631 - DI13 delay			
Adjustable range:	0 to 3000 x 500 µs	Factory setting:	170 x 500 µs

Description:

- Delay of DI13 of the MVC3 board, used to disable the inverter after the transfer.
- This time is used to compensate the delay on the transfer circuit, preventing the motor from remaining for a time interval without voltage.

P0632 - Maximum phase error			
Adjustable range:	0 to 9999	Factory setting:	1966

Description:

- Phase error between the line voltage and the inverter voltage used together with P0629 (Synchronism time) to indicate synchronism OK.

P0636 - Phase adjustment			
Adjustable range:	-32768 to 32767	Factory setting:	0

Description:

- Parameter used to compensate the phase error between the voltage the inverter uses as reference for synchronism and the actual voltage in the point where the transfer will occur.

P0652 - MVC3 AO1 Funct.			
Adjustable range:	0 to 255	Factory setting:	2

Description:

- It defines the function of the analog output.

Table 5.87: Function of the analog outputs of the MVC3 board

P0652, P0654, P0656 and P0658	Function	Full scale
0	Phase Current V	5 V = P0295
1	Phase Current W	5 V = P0295
2	Phase Current U	5 V = P0295
3	Output Frequency	10 V = 120 Hz
4	Angle of the Fundamental Output Voltage	10 V = +180º
5	Modulation Index	5 V = 255
17	Reference of Voltage and Field Current for Synchronous Machine	10 V = P0462 (A) 10 V = P0463 (V)
18	Position Adjustment of the Absolute Encoder	10 V = +180°
34	Value fixe at 0 V	-
35	Value fixe at 10 V	-
36	Value fixe at -10 V	-
37	Voltage between Phase A and B Measured on the Line ISOX Board	5 V = VAB Rated
38	Voltage between Phase B and C Measured on the Line ISOX Board	5 V = VBC Rated
66	Inverter Status	-
86	Indication of A0073	0 V = without A0073 10 V = with A0073
187	Value of Analog Input AI1 MVC3	-
188	Torque Reference of the Inverter	-10 = -200 % * 10 V = +200 % *

* Torque percentage regarding the motor torque.

NOTE!
For other options not described in Table 5.87 on page 5-120 contact WEG Technical Assistance.

P0653 - MVC3 AO1 Gain			
Adjustable range:	0.000 to 9.999	Factory setting:	1.000

Description:

- It sets the gain of analog output.

P0654 - MVC3 AO2 Funct.			
Adjustable range:	0 to 255	Factory setting:	5

Description:

- It defines the function of the analog output.
- Refer to Table 5.87 on page 5-120 for further details regarding the functions of the analog outputs of the MVC3 board.

P0655 - MVC3 AO2 Gain			
Adjustable range:	0.000 to 9.999	Factory setting:	1.000

Description:

- It sets the gain of analog output.

P0656 - MVC3 AO3 Funct.			
Adjustable range:	0 to 255	Factory setting:	2

Description:

- It defines the function of the analog output.
- Refer to Table 5.87 on page 5-120 for further details regarding the functions of the analog outputs of the MVC3 board.

P0657 - MVC3 AO3 Gain			
Adjustable range:	0.000 to 9.999	Factory setting:	1.000

Description:

- It sets the gain of analog output.

P0658 - MVC3 AO4 Funct.			
Adjustable range:	0 to 255	Factory setting:	5

Description:

- It defines the function of the analog output.
- Refer to Table 5.87 on page 5-120 for further details regarding the functions of the analog outputs of the MVC3 board.

P0659 - MVC3 AO4 Gain			
Adjustable range:	0.000 to 9.999	Factory setting:	1.000

Description:

- It sets the gain of analog output.

P0663 - OFFSET AO1 MVC3 P0664 - OFFSET AO2 MVC3 P0665 - OFFSET AO3 MVC3 P0666 - OFFSET AO4 MVC3			
Adjustable range:	-32768 to 32767	Factory setting:	-90

Description:

- It sets the offset of analog output.

-32768 = -100 %
32768 = 100 %

P0667 - MVC3 AO1 value P0668 - MVC3 AO2 value P0669 - MVC3 AO3 value P0674 - MVC3 AO4 value	
Resolution:	0.01 %

Description:

- It indicates the value of the respective analog output of the MVC3 control board.

P0721 - Analog input AI5 function			
Adjustable range:	0 to 0	Factory setting:	0

Description:

- When the option 0 (P0221/P0222) is selected, AI5 is able to provided the (if programmed so in P0221/P0222), subject to the reference limits (P0133, P0134) and the ramp action (P0100 to P0103).
- See Figure 5.25 on page 5-44 .

Table 5.88: *Analog input AI5 function*

P0721	Function
0	P221/P222

NOTE!
This parameter can be changed only with the motor stopped.

P0722 - Input AI5 Gain			
Adjustable range:	0.000 to 9.999	Factory setting:	1.000

Description:

- Refer to P0234 (AI1 Gain).

P0723 - Analog input AI5 signal type			
Adjustable range:	0 to 3	Factory setting:	0

Description:

- For options 2 and 3 inverse reference is attained, that is, maximum speed is obtained with minimum reference.
- When current signals are used at AI5 input, put S3.1 switch on the MVC4 control board in “ON” position.

Table 5.89: *Analog input AI5 signal type*

P0723	Function
0	0-10V/20mA
1	4 - 20 mA
2	10V/20mA-0
3	20 - 4 mA

NOTE!
This parameter can be changed only with the motor stopped.

P0724 - Input AI5 offset			
Adjustable range:	-100.0 to 100.0 %	Factory setting:	0.0 %

Description:

- Refer to P0234 (AI1 Gain).

P0725 - Minimum coasting time			
Adjustable range:	0 to 300 s	Factory setting:	0 s

Description:

- The minimum coasting time determines for how long the inverter will not be accepting the General Enable or Start/Stop command after a General disable (P0232 = 1).
- By programming 0 at this parameter the function is deactivated.

P0727 - Parallelism of inverters			
Adjustable range:	0 to 4	Factory setting:	0

Description:

- Parallelism of inverters.

Table 5.90: *Parallelism of inverters*

P0727	Function
0	Without parallelism
1	2 inverters in parallel
2	3 inverters in parallel
3	4 inverters in parallel
4	No parallelism and 2 temperatures in the rectifier

NOTE!
This parameter can be changed only with the motor stopped.

P0740 - AI1 MVC3 Funct.			
Adjustable range:	0 to 2	Factory setting:	0

Description:

- It defines the function of the AI1 analog input of the MVC3 board.

Table 5.91: *AI1 MVC3 Funct.*

P0740	Function
0	Not Used
1	Torque reference
2	Limit current

P0741 - AI1 MVC3 Gain			
Adjustable range:	0.000 to 9.999	Factory setting:	1.000

Description:

- It sets the gain of analog input AI1 of the MVC3 board.
- Refer to P0234 (AI1 Gain).

P0742 - AI1 MVC3 Offset			
Adjustable range:	-100.0 to 100.0 %	Factory setting:	0.0 %

Description:

- It sets the offset of analog input AI1 of the MVC3 board.
- Refer to P0234 (AI1 Gain).

P0743 - Modulation levels			
Adjustable range:	0 to 1	Factory setting:	0

Description:

- Modulation levels.

Table 5.92: *Modulation levels*

P0743	Function
0	3 Levels
1	5 Levels

NOTE!
This parameter can be changed only with the motor stopped.

P0744 - AI2 MVC3 Funct.			
Adjustable range:	0 to 1	Factory setting:	0

Description:

- It defines the function of the AI2 analog input of the MVC3 board.

Table 5.93: *AI2 MVC3 Funct.*

P0744	Function
0	Not Used
1	Field current

P0745 - AI2 MVC3 Gain			
Adjustable range:	0.000 to 9.999	Factory setting:	1.000

Description:

- It sets the gain of analog input AI2 of the MVC3 board.
- Refer to P0234 (AI1 Gain).

P0746 - AI2 MVC3 Offset			
Adjustable range:	-100.0 to 100.0 %	Factory setting:	0.0 %

Description:

- It sets the offset of analog input AI2 of the MVC3 board.
- Refer to P0234 (AI1 Gain).

P0936 - Maximum torque			
Adjustable range:	0 to 85 %	Factory setting:	60 %

Description:

- It defines the motor torque value to activate the operation of the energy saving function.
- It is recommended to set this parameter to 60 %, but it must be set according the application requirements.

NOTE!
Value at 0 % disables the energy saving function.

P0937 - Minimum Speed			
Adjustable range:	0 to 7200 rpm	Factory setting:	900 rpm

Description:

- It defines the minimum speed value at which the energy saving function will remain active.
- The hysteresis for the minimum speed level is 2 Hz.

P0940 - Q Factor			
Adjustable range:	0.0000 to 0.9999	Factory setting:	0.9995

Description:

- It indicates the speed reference value in rpm (factory setting).
- Independent from the reference source origin (HMI, serial communication, analog input, among others).
- The indication scale can be changed via P0208 (Reference scale factor).

P0950 - Motor Type			
Adjustable range:	0 to 3	Factory setting:	0

Description:

- The proposed speed controller with notch filter, suppresses the torque command within the resonant source frequency of mechanical vibration, since the vibration is enlarged by the motor torque within the mechanical resonant frequency band.

- The mechanical resonant frequency is dependent on mechanical structure and coupling devices.
- The traditional notch filter has the following transfer function:

$$H(s) = \frac{s^2 + \omega_n^2}{s^2 + 2\zeta\omega_n S + \omega_n^2}$$

Table 5.94: *Motor Type*

P0950	Function
0	Induction motor
1	Synchronous motor with brushes
2	Brushless synchronous motor
3	Permanent magnet synchronous motor

NOTE!
This parameter can be changed only with the motor stopped.

6 SPECIAL FUNCTIONS

6.1 TRACE FUNCTION

The Trace function is used to register parameters (e.g., current, voltage, speed) when a certain event occurs on the system (e.g., alarm/fault, high current, etc.). This event on the system, for triggering the data storage process, is called trigger and is essential in the Trace function.

The data stored by the trace function can be seen at the inverter analog outputs or on a computer by using WEG Programming Suite (WPS) software.

6.1.1 Trigger

Trigger can be understood as the element that defines the beginning of a process that, in this case, is recording and storing data of the channels programmed for trace in the memory of the control boards.

WARNING!
If a TRIGGER condition that is fulfilled immediately after the data capture is enabled (P0571 = 1), is programmed, then the TRACE function data will not be valid.

6.1.2 Data Access

Data stored by the Trace function can be visualized at the inverter analog outputs or on a PC by using the WPS software. There are eight channels available for the Trace function, and they are all synchronized with the trigger (the trigger simultaneously causes the storage of all the active channels).

6.1.3 Sampling

Sampling time is the time interval between the points stored by the Trace function (refer to the Figure 6.1 on page 6-1). If, for instance, a 1 ms (1 millisecond or 1/1000 second) is programmed, it means that 1000 points per second will be stored in each channel.

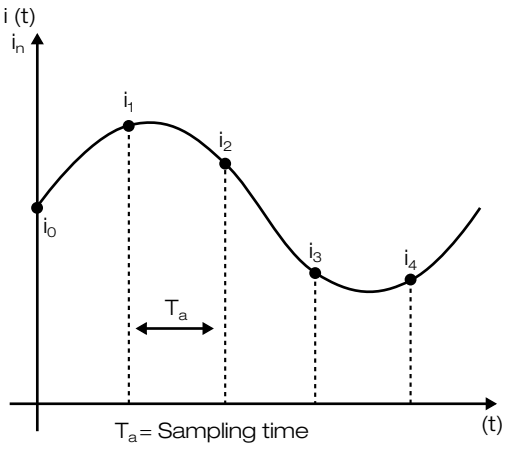


Figure 6.1: *Trace function signal sampling example*

The sampling time is the same for all the channels programmed in the Trace function, and it can be programmed as a multiple of 500 µs.

6.1.4 Pre-Trigger

It is possible to program a pre-trigger time as a percentage of the trigger (see Figure 6.2 on page 6-2), meaning that part of the data stored by the Trace function will be stored before the trigger event.

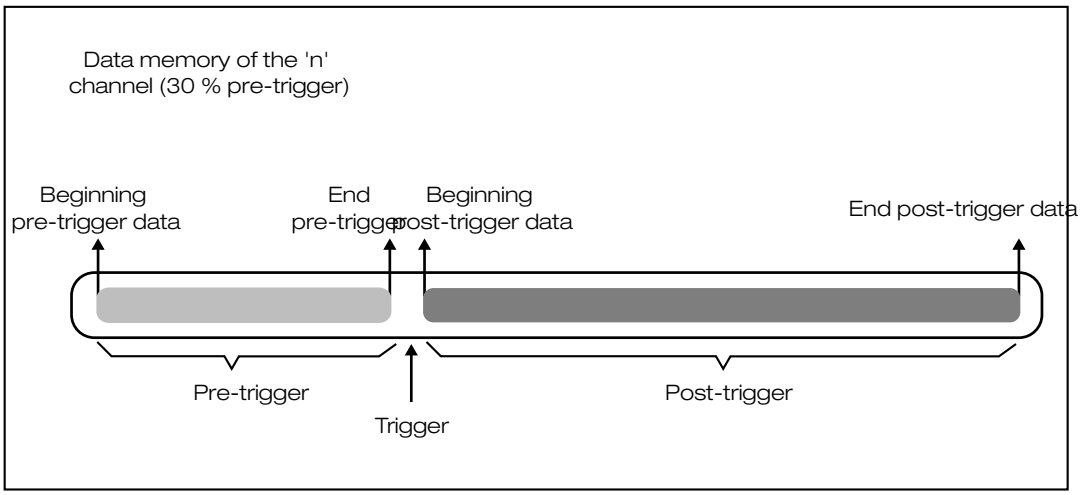


Figure 6.2: *Example of Trace function data distribution for one channel with 30 % programmed pre-trigger*

6.1.5 Trace function use and programming example

The first step to use the Trace function is to enable the trace configuration parameters by programming P0203 = 2 (Trace) or P0203 = 3 (Trace+PID), thus the configuration parameters (P0550 to P0572) become accessible.

The factory default settings for the Trace function may be applied by the user as a reference and, if convenient, as the programming base for other trace configurations.

This standard configuration is a Trace function programming example, with trigger caused by inverter fault, and default parameters programmed at the trace channels. Data for this programming can be observed in Table 6.1 on page 6-3.

Table 6.1: *Standard trace programming data*

Parameter	Description	Programming
P0498	Force trigger	Off
P0550	Trigger parameter	Inactive
P0551	Trigger value	0
P0552	Trigger condition	Fault
P0553	Sampling time	4 x 500 µs
P0554	Pre-trigger	50 %
P0555	CH1: Parameter	Motor Speed
P0556	CH1: Mask	None
P0557	CH2: Parameter	Motor Current
P0558	CH2: Mask	None
P0559	CH3: Parameter	DC Link Voltage
P0560	CH3: Mask	None
P0561	CH4: Parameter	Motor Frequency
P0562	CH4: Mask	None
P0563	CH5: Parameter	VFD Status
P0564	CH5: Mask	None
P0565	CH6: Parameter	Motor Voltage
P0566	CH6: Mask	None
P0567	CH7: Parameter	Motor Torque
P0568	CH7: Mask	None
P0569	CH8: Parameter	Inverter output power
P0570	CH8: Mask	None
P0571	Start trace	Off
P0572	Trace memory	50 %

Trigger parameter (P0550) and Trigger value (P0551) can assume any value, because the trigger condition is an inverter fault trip, which is independent from the other trigger parameter configurations.

The Trace function can be enabled for the data acquisition by programming P0571 = 1 (On). In this condition, Trace is storing the pre-trigger data (50 %) and parameter P0029 shows (1) – Waiting.

When the inverter trips with a fault, then the trace memory will be filled with the post-trigger data (50 %) and P0029 will indicate (2) - Triggered.

When the acquisition of post-trigger acquisition is complete, P0029 will indicate - Trace Finished. At this point, the Trace data can be visualized at the analog outputs by programming them (P0251, P0253, P0255, P0257, P0259 and P0261) with the respective trace channel. If the function is not in the Trace Finished state (P0029 = 3), the analog outputs programmed for those channels will output a zero value.

6.1.6 Example of use and trigger configuration

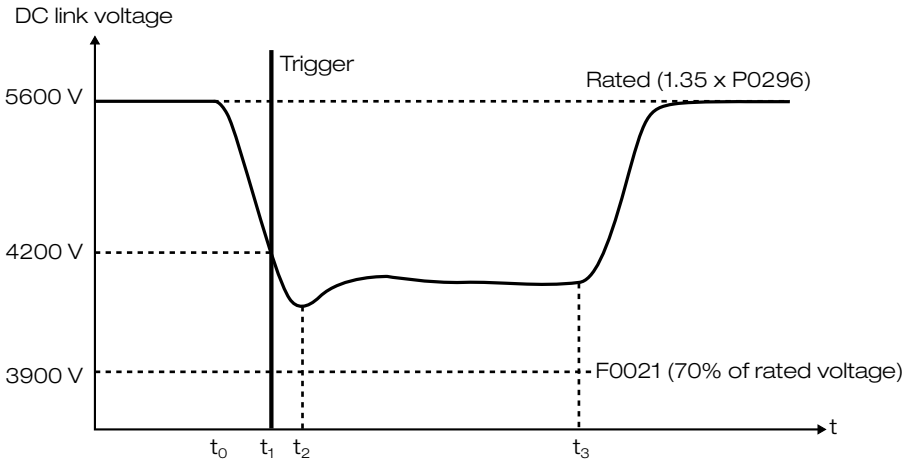
Case study: obtain the voltage behavior of DC link when a line loss occurs with the Ride-Through function active.

For the MVW01 inverters, the DC link rated voltage is 930 V. As it is desired to obtain a voltage wave form of the busbar when occurs a specific fault (lack of network), it is not feasible to set the trigger by the occurrence of fault, since any fault would satisfy such a condition. For this situation the trigger must be set by the DC link voltage, once it tends to zero when a network fault occurs. In the following example, after the DC link has rated voltage, we can activate the trace function (P0571) and observe its status (P0029).

Example of configuration:

Table 6.2: Example of using and configuring the trigger

Parameter	Description	Programming
P0550	Trigger parameter	DC Link Voltage
P0551	Trigger value	4200 V
P0552	Trigger condition	Value <
P0553	Sampling time	10 × 500 µs
P0554	Pre-trigger	25 %
P0555	CH1: Parameter	DC Link Voltage
P0556	CH1: Mask	None
P0571	Start trace	On



t_0 - Line loss.
t_1 - Trace function trigger.
t_2 - Ride-through actuation.
t_3 - Line feedback.

Figure 6.3: Waveform of the DC bus voltage obtained by the trace function

6.2 PID REGULATOR

The MVW01 has the PID regulator function, which can be used to control a closed loop process. That function consists of a controller with proportional, integral and derivative gain, superposed to the normal MVW01 speed control.

In order to keep the process variable (the one to be controlled - water level in a reservoir, for instance) at the value adjusted with the setpoint, the speed will be varied automatically by the PID regulator.

That regulator is able, for instance, to control the flow in a pipeline by means of flow feedback applied to the analog input AI2 or AI3 (selected through P0524), and setpoint according to the P0221 or P0222 definition (e.g., AI1), with the inverter driving the pump that is responsible for the pipeline flow.

Other application examples are: Level or temperature control, dosage, etc.

The PID regulator function is activated by setting P0203 = 1 or 3. The Figure 6.4 on page 6-6 presents a Academic PID Regulator block diagram. The Academic PID Regulator transference function in the frequency domain is:

$$y(s) = Kp\, e(s)\left(1 + \frac{1}{sTi} + sTd\right)$$

Replacing the integrator by a sum and the derivative by the incremental quotient, we will obtain an approximate value for the discrete (recursive) transfer equation shown next:

$$y(kTa) = y(k-1)Ta + Kp[(e(kTa) - e(k-1)Ta) + Ki\ e(k-1)Ta + Kd(e(kTa) - 2e(k-1)Ta + e(k-2)Ta)]$$

Where:
Kp (Proportional Gain): Kp = P0520 x 4096.
Ki (Integral Gain): Ki = P0521 x 4096 = [Ta/Ti x 4096].
Kd (Differential Gain): Kd = P0522 x 4096 = [Td/Ta x 4096].
Ta = 0.02 s (PID regulator sampling period).
SP*: reference, maximum 13 bits (0 to 8191).
X: process variable (or controlled), read through AI2 or AI3, maximum 13 bits.
e(kTa): current output.
y(kTa): current PID output, maximum 13 bits.
y(k-1)Ta: previous PID output.
e(kTa): current error [SP*(k) - X(k)].
e(k-1)Ta: previous error [SP*(k-1) - X(k-1)].
e(k-2)Ta: error at two previous samplings [SP*(k-2) - X(k-2)].

The feedback signal must be connected to the analog input AI2' and AI3' (see Figure 6.4 on page 6-6).

Setpoint can be defined via:

- Keypad: parameter P0525.
- Analog inputs AI1', AI2', AI3', AI4', AI5', (AI1' + AI2') > 0, (AI1' + AI2'), Multispeed, Serial, Fieldbus.

Note: When P0203 = 1 or 3, do not use the reference via P.E. at P0221/P0222 = 7.

When the PID function is enabled (P0203 = 1 or 3):

- One of the digital inputs from DI3 to DI10 can select between manual and automatic PID operation (P0265 to P0272).
- When the PID regulator function is activated (P0203 = 1 or 3), the digital input DI3 is automatically programmed for the Manual/Automatic function (P0265 = 15):

Table 6.3: *DIx operation mode*

DIx	Action type
0 (0 V)	Manual
1 (24 V)	Automatic

P0040 indicates the process variable value (feedback) in the selected scale and unit. In order to avoid the feedback analog input saturation during the regulation overshoot, the signal must vary between 0 and 9.0 V (0(4) to 18 mA). The adaptation between the setpoint and the feedback can be done changing the gain of the analog input selected as feedback (P0238 for AI2 or P0242 for AI3). The Process variable can also be visualized at the outputs AO1 to AO6, provided that programmed at P0251, P0253, P0255, P0257, P0259 and P0261. This is also valid for the PID setpoint.

The outputs DO1, DO2 and RL1 to RL5 can be programmed (P0275 to P0277, P0279 to P0282) for the functions Process Variable > VPx (P0533)" and Process Variable < VPy (P0534)".

The functions JOG and Forward/Reverse remain disabled. Enable and Start/Stop commands are defined at P0220, P0224 and P0227.

If the setpoint is defined by P0525 (P0221 or P0222 = 0), and the system is changed from manual to automatic, then P0525 is automatically adjusted with the P0040 value. In this case the transition from manual to automatic is smooth (there is no sudden speed variation).

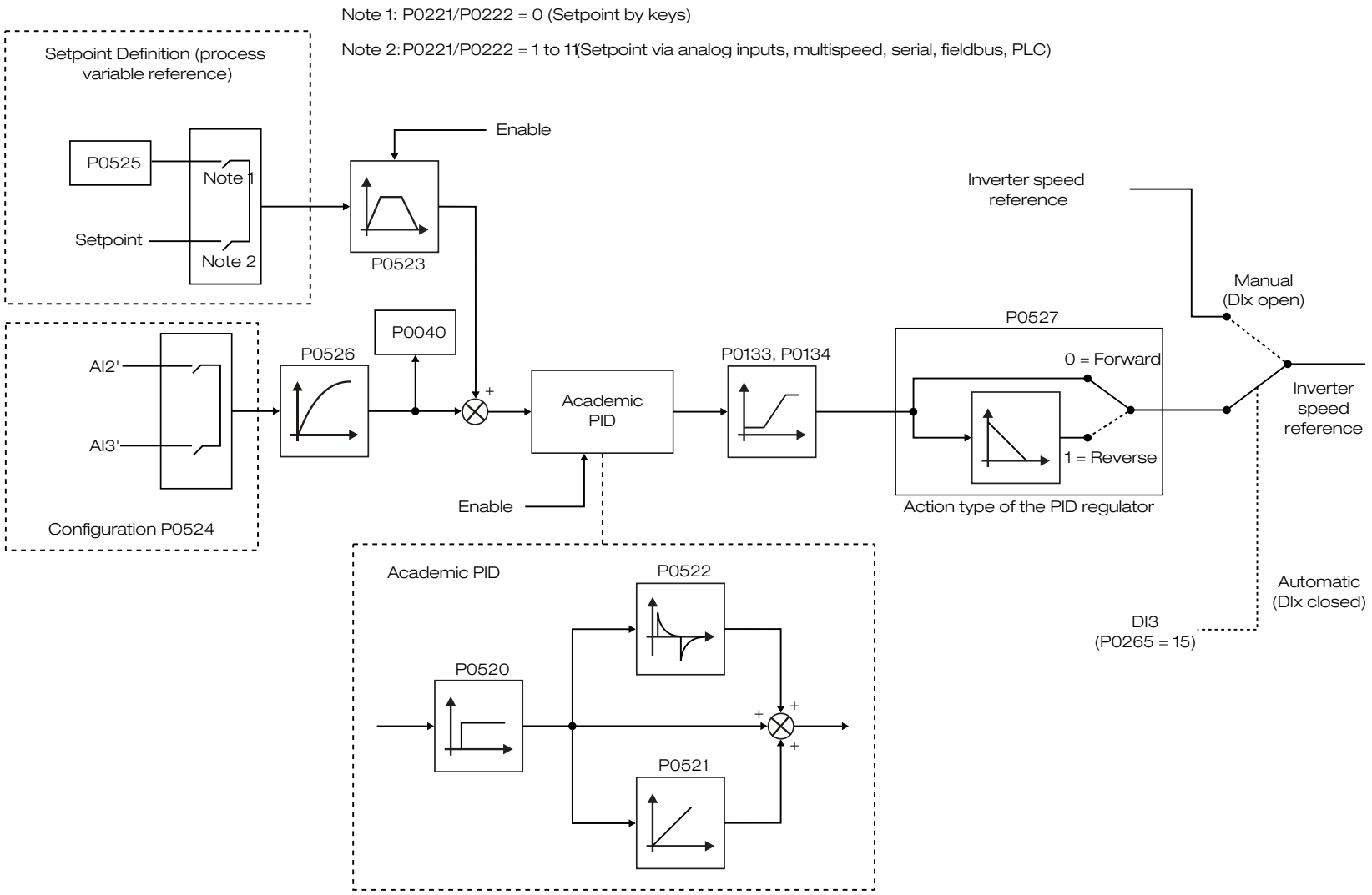


Figure 6.4: *Academic PID regulator block diagram*

7 COMMUNICATION NETWORKS

The MVW01 can be connected to communication networks allowing control and parameter setting.

For the MVW01 to communicate on the Profibus DP, DeviceNet, Ethernet/IP or PROFINET network, it is necessary to use a communication board provided via an optional kit with the desired Fieldbus standard.

7.1 FIELDBUS

Profibus DP-V0 fieldbus kit (code 10932880)

Quantity	Description	Code
1	ABS Profibus DP communication board	10413436
1	Connection cable	10050246

Profibus DP-V1 fieldbus kit (code 10933427)

Quantity	Description	Code
1	ABS Profibus DP-V1 communication board	10413449
1	Connection cable	10050246

DeviceNet fieldbus kit (code 10932883)

Quantity	Description	Code
1	ABS DeviceNet communication board	10413435
1	Connection accessory	10413374

DeviceNet Drive Profile fieldbus kit (code 10933426)

Quantity	Description	Code
1	ABS DeviceNet communication board	10413437
1	Connection accessory	10413374

Ethernet/IP fieldbus kit (code 10933495)

Quantity	Description	Code
1	ABS Ethernet/IP communication board	10193758

Profinet fieldbus kit (code 13760262)

Quantity	Description	Code
1	ABS PROFINET IO communication board	13759351

NOTE!

- For communication with Modbus-TCP/IP protocol, use the Ethernet/IP fieldbus kit.
- The chosen Fieldbus option can be specified in the appropriate field of the MVW01 coding. In this case, the user receives the MVW01 with all the necessary components already installed on the product. In the subsequent purchase of the optional fieldbus kit, the installation must be done by the user himself.

7.1.1 Introduction

This chapter provides the necessary description for network operation of the MVW01, using the optional communication board for Profibus DP, DeviceNet, Ethernet/IP and PROFINET. The subjects covered in this item include:

- Description of the communication kit.
- Features of the MVW01 in a fieldbus network.
- Parameterization of the MVW01.

- Operation of the MVW01 via fieldbus interface.
- Errors and possible causes.

FIELDBUS NETWORK

“Fieldbus” is a generic term used to describe a digital communication system connecting various equipment in the field, such as sensors, actuators and controllers. A fieldbus network functions like a local communication network.

Currently, there are several different protocols used for communication between devices in the field, including the Profibus DP, DeviceNet, Ethernet/IP and PROFINET protocols. In this item, which deals with the use of communication boards for the Profibus DP, DeviceNet, Ethernet/IP and PROFINET protocols, the term fieldbus will be used to generically designate these protocols.

ABBREVIATIONS AND DEFINITIONS

CAN	Controller Area Network
DP-V0	Decentralized Periphery Version 0
DP-V1	Decentralized Periphery Version 1
I/O	Input / Output
ODVA	Open DeviceNet Vendor Association
PLC	Programmable Logic Controller
HMI	Human-Machine-Interface

NUMERICAL REPRESENTATION

- Decimal numbers are represented by means of digits without suffix.
- Hexadecimal numbers are represented with the letter ‘h’ after the number.

7.1.2 Installation

The communication board that forms the Fieldbus kit is directly installed on the MVC4 control board, connected to the XC140 connector and fixed by spacers.

NOTE!
Follow the safety instructions in Chapter 2 SAFETY INSTRUCTIONS on page 2-1 .

If a function expansion board (EBA/EBB) is already installed, it is necessary to remove it temporarily.

1. Power down the control rack.
2. Remove the screw attached to the metal spacer next to THE XC140 connector (MVC4).
3. Carefully insert the pin bar connector of the Fieldbus electronic board into the XC140 female connector of the MVC4 control board. Check the exact match of all the pins of the XC140 connector according to Figure 7.1 on page 7-3 .
4. Press the board close to XC140 and on the lower right corner until the connector and plastic spacer are completely inserted.
5. Fix the board to the metal spacer using the screw.
6. Connect one end of the cable to the control rack the MVW01 , and the other end to the Fieldbus board

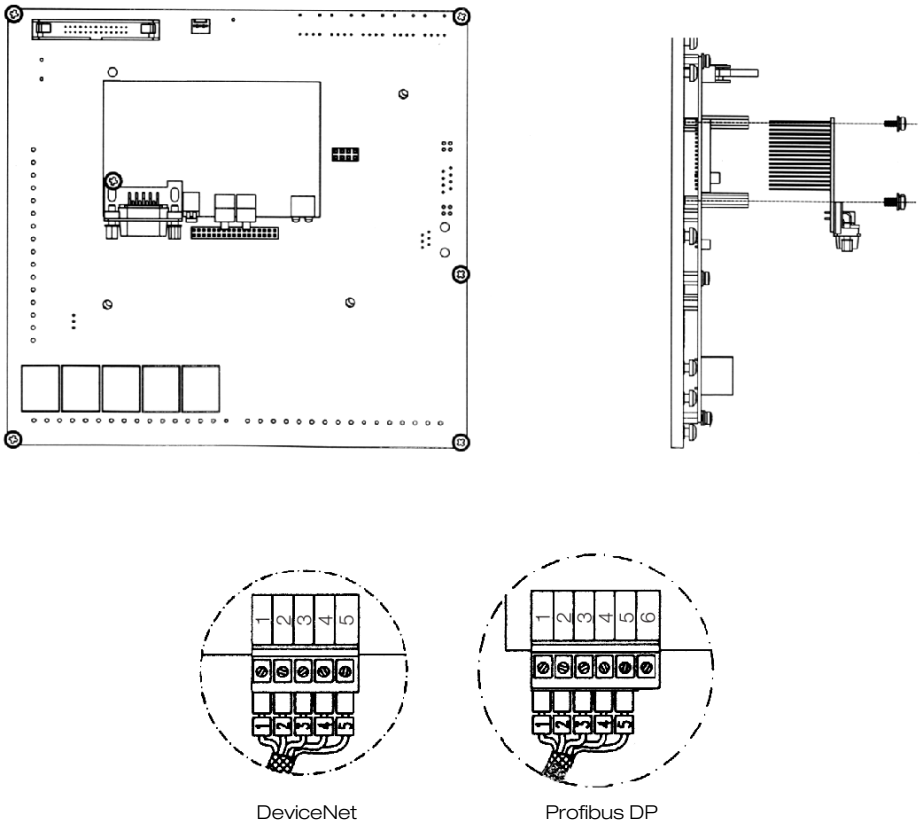


Figure 7.1: *Installing the Fieldbus electronic board*

7.1.3 Fieldbus communication parameters

The MVW01 has a set of parameters, described below, for setting the device on the Fieldbus network.
Before starting the network operation, it is necessary to configure these parameters so that the inverter operates as desired.

P0309 - Fieldbus			
Adjustable range:	0 to 13	Factory setting:	0

This parameter allows enabling the fieldbus board and setting the number of words communicated between the MVW01 and the network master.

P0309	Function
0	Inactive
1	Profibus DP 2 I/O
2	Profibus DP 4 I/O
3	Profibus DP 6 I/O
4	DeviceNet 2 I/O
5	DeviceNet 4 I/O
6	DeviceNet 6 I/O
7	Modbus-RTU 2 I/O
8	Modbus-RTU 4 I/O
9	Modbus-RTU 6 I/O
10	DeviceNet Drive Profile
11	Ethernet 2 I/O
12	Ethernet 4 I/O
13	Ethernet 6 I/O

It is possible to select three different communication options, containing 2, 4 or 6 input/output words (2, 4 or 6 words, where 1 word = 2 bytes). The content of each word is described in the Section 7.1.9 Operation via network

on page 7-24 .

NOTE!
The Ethernet settings include the Ethernet/IP, Profinet-IO and Modbus TCP/IP protocols.

P0313 - Action for communication error

Adjustable range: 0 to 5 Factory setting: 0

If the drive is being controlled via network, and a problem communicating with the master occurs (cable break, power failure, master failure, etc.), it will not be possible to send a command via network to disable the device. In applications where that is an issue, it is possible to program an action in P0313 that the MVW01 will automatically execute in case of a network failure.

Table 7.1: *Communication error action*

P0313	Function
0	Stop by ramp
1	General disable
2	No action
3	Go to LOC
4	Reserved
5	Fault

For fieldbus communication, errors 129 (Fieldbus Connec. Inactive) and error 130 (Inactive Fieldbus board) are considered communication errors.

- **0 - Ramp stop**: It disables the motor by deceleration ramp in case of a communication error.
- **1 - General disable**: In this option, the MVW01 cuts off the power to the motor, which should coast to a stop.
- **2 - No action**: if one of the errors previously mentioned occurs, the drive remains in its current state and only indicates the error.
- **3 - Change to LOC**: If you are operating in REMOTE mode, and a communication error occurs, it will automatically go to LOCAL mode.
- **5 - Fault**: Upon detecting a communication fault, it will go to the error state, the motor will be disabled, and the error indication will only be removed after resetting the device errors.

NOTE!
The *Ramp stop* and *Change to LOC* commands can only be executed if they are being controlled via fieldbus. This setting is done through parameters P0220 (LOCAL/REMOTE selection source), P0224 (Start/Stop Selection LOCAL Situation) and P0227 (Start/Stop Selection REMOTE Situation).

LOCAL setting:

P0220 - LOCAL/REMOTE selection source
P0221 - Speed reference selection LOCAL situation
P0223 - Forward/Reverse Selection LOCAL Situation
P0224 - Start/Stop Selection LOCAL Situation
P0225 - Selection of JOG Source LOCAL Situation

REMOTE setting:

P0220 - LOCAL/REMOTE selection source
P0222 - Speed reference selection REMOTE situation
P0226 - Selection of Direction of ROTATION REMOTE Situation

P0227 - Start/Stop Selection REMOTE Situation

P0228 - JOG Selection - REMOTE Situation

These parameters define the source of commands and references for the inverter in the LOCAL and REMOTE modes.
For the commands that will be controlled via network, set it in the “Fieldbus” option.

P0275 - DO1 Function

P0276 - DO2 Function

P0277 - RL1 Function

P0279 - RL2 Function

P0280 - RL3 Function

P0281 - RL4 Function

P0282 - RL5 Function

These parameters define the function of the inverter digital outputs.
For the digital outputs that will be controlled via network, set it in the “Fieldbus” option.

7.1.4 Profibus DP

The term Profibus is used to describe a digital communication system that can be used in several application fields. It is an open and standardized system, defined by IEC 61158 and IEC 61784 standards, which covers from the physical medium used to data profiles for certain device sets.
In this system, the DP communication protocol was developed to allow fast, cyclical and deterministic communication between masters and slaves.

Among the various communication technologies that can be used in this system, Profibus DP technology means a solution that is typically composed of the DP protocol, RS-485 transmission medium and application profiles, used mainly in applications and devices focused on manufacturing automation.

Currently, there is an organization called Profibus International, responsible for maintaining, updating and disseminating Profibus technology among users and members. Further information regarding the technology, as well as the complete protocol specification, can be obtained from this organization or from one of the regional associations or centers of competence linked to the Profibus International.

7.1.4.1 Baud rates

The Profibus DP protocol defines a series of baud rates that can be used, from 9.6 Kbit/s to 12 Mbit/s. The maximum length of the transmission line depends on the baud rate used, and this relationship is shown in Table 7.2 on page 7-5 .

Table 7.2: *Baud rate and cable length*

Baud rate [kbps]	Maximum cable length [m]
9.6	1200
19.2	1200
45.45	1200
93.75	1200
187.5	1000
500	400
1500	200
3000	100
60000	100
12000	100

The communication board of the MVW01 has automatic baud rate detection, according to the settings of the network master, and setting this option is not required.

7.1.4.2 Addressing

The Profibus DP protocol allows connecting up to 126 devices to the network, among masters and slaves, with addresses from 0 (zero) to 125 (addresses 126 and 127 are reserved). Each device on the network must have a different address.

The MVW01 has two rotating switches that allow selecting the address on the Profibus DP network from 0 (zero) to 99. The drive address is formed by the values of those switches, where the left rotating switch (next to the Profibus connector) provides the tens digit, while the right rotating switch (next to the LED indicators) provides the units digit.

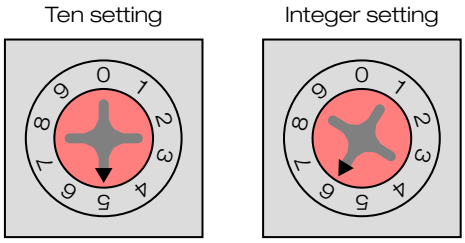


Figure 7.2: *Example showing how to set address 56 on the Profibus DP board*

7.1.4.3 LED indicators

The Profibus DP communication board has four LEDs for the device diagnostics.

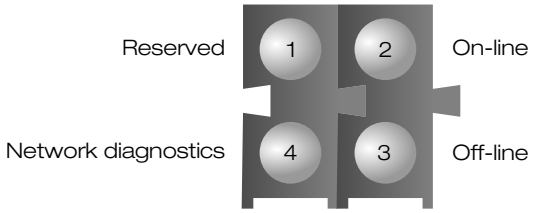


Figure 7.3: *Profibus DP network status LEDs*

Table 7.3: *Network status LED indicators*

LED	Color	Function
On-line	Green	**Off:** drive is not online **On:** drive is online
Off-line	Red	**Off:** drive is not offline **On:** drive is offline
Network diagnostics	Red	**Off:** without diagnostics **Flashing 1 Hz:** error in the setting of the number of input and/or output words communicated with the master **Flashing 2 Hz:** error in parameter data communicated via network (not used) **Flashing 4 Hz:** error in the initialization of the component responsible for processing the Profibus communication (ASIC)

7.1.4.4 Connector

To connect to the network, the fieldbus kit for Profibus DP of the MVW01 has a connecting cable with a 6-way plug-in connector at one end that must be connected to the communication board, and a DB9 female connector at

the other end used for connection to the Profibus DP bus. The pinout of these connectors follows the description in Table 7.4 on page 7-7.

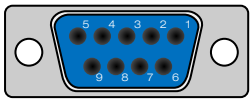


Table 7.4: *Connection of (DB9) pins for Profibus DP*

Pin	Description	Function
1	Not connected	-
2	Not connected	-
3	B-Line	Positive RxD/TxD, according to RS-485 specification
4	Not connected	-
5	GND	0 V isolated from the RS-485 circuit
6	+5 V	+5 V isolated from the RS-485 circuit
7	Not connected	-
8	A-Line	Negative RxD/TxD, according to RS-485 specification
9	Not connected	-
Frame	Shield	Connected to the protective earth (PE)

7.1.4.5 Profibus DP cable

In the installation, it is recommended to use type A cable, whose characteristics are described in Table 7.5 on page 7-7. The cable has a pair of wires that must be shielded and twisted to ensure greater immunity to electromagnetic interference.

Table 7.5: *Properties of type A cable*

Impedance	135 to 165 Function
Capacitance	30 pf/m
Resistance and loop	110/km
Cable diameter	> 0.64 mm
Wire cross section	> 0.34 mm

7.1.4.6 Connection of the drive to the network

The Profibus DP protocol, using RS485 physical medium, allows connecting up to 32 devices per segment without repeaters. With repeaters, up to 126 addressable devices can be connected to the network. Each repeater must also be included as a device connected to the segment, although it will not take an address in the network.

It is recommended that all the devices present on the Profibus DP network be connected from the main bus. In general, the connector of the Profibus network itself has one input and one output for the cable, allowing the connection to be taken to the other points of the network. Shunts from the main line are not recommended, especially for baud rates greater than or equal to 1.5 Mbit/s.

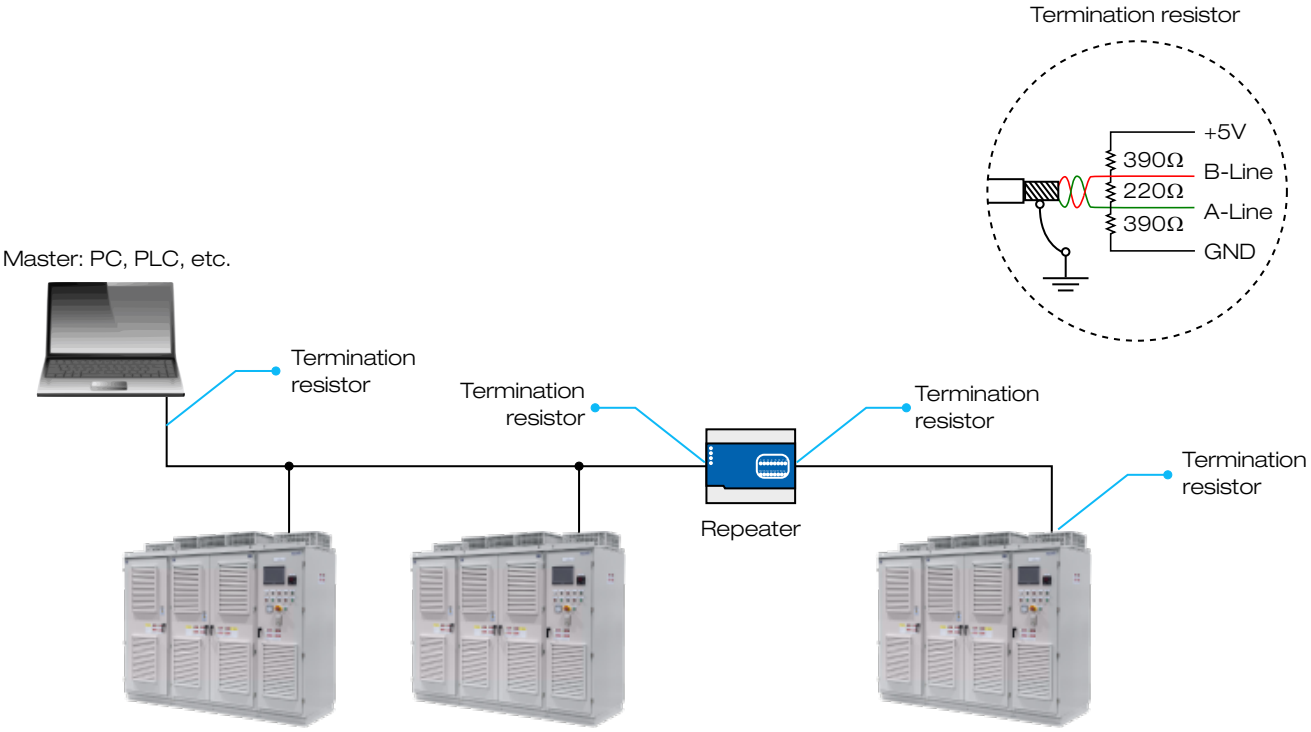


Figure 7.4: *MVW01 on Profibus DP network*

The Profibus DP network cable must be routed separately (and if possible distant) from the power supply cables. All drives must be properly grounded, preferably on the same connection with the ground. The Profibus cable shield must also be grounded. The DB9 connector of the Profibus board of the MVW01 already has a connection to the protective earth and, thus, connects the shield to the ground when the Profibus connector is connected to the drive. However, a better connection, by means of fixing clamps between the shield and a grounding point, is also recommended.

7.1.4.7 Termination resistor

For each segment of the Profibus DP network, it is necessary to enable a termination resistor at the ends of the main bus. The communication board of the MVW01 itself has a switch for enabling the resistor, which should only be enabled (ON position) if the drive is the first or the last element in the segment.

That switch must also remain disabled if the Profibus DP network connector already has the termination resistor enabled.

It is worth to mention that, to allow disconnecting the element from the network without damaging the bus, it is recommended to place active terminations, which are elements that just play the role of the termination. Thus, any drive on the network can be disconnected from the bus without damaging the termination.

7.1.4.8 Configuration file (GSD file)

Every element of the Profibus DP network has an associated configuration file with GSD extension. This file describes the features of each device, and it is used by the configuration tool of the Profibus DP network master. During the master configuration, the GSD configuration file, supplied with the equipment, must be used.

The communication board used by the MVW01 was developed by the company HMS Industrial Networks AB. Therefore, in the network configuration software, the product will not be recognized as MVW01 but as “AnyBus-S PDP” or “AnyBus-S Profibus DPV1” in the “General” category.

7.1.4.9 Profibus DP-V1 – Parameters access

The DP-V1 communication kit supports class 1 and 2 DP-V1 services. By using these services, in addition to the exchange of cyclic data, it is possible to read/write on parameters through DP-V1 acyclic functions, via both the network master and a commissioning tool. Parameters are mapped based on the index and slot addressing, as shown in the equation below:

- Slot: (parameter number - 1) / 255.
- Index: (parameter number -1) MOD 255.

Example: Parameter P0100 will be identified through acyclic messages as located in slot 0, index 99.
Parameter P0312 will be identified through acyclic messages as located in slot 1, index 57.

The value for the parameters is always communicated with a size of 2 bytes (1 word). The value is also transmitted as an integer, without a decimal point, and its representation depends on the resolution used.

Example: P0003 = 3.6 A → The value read via network is 36.

7.1.5 DeviceNet

Initially developed by Allen-Bradley in 1994, the DeviceNet communication protocol is used to interconnect controllers and industrial devices, such as sensors, valves, starters, barcode readers, frequency inverters, panels and operating interfaces. Currently, there are several suppliers of PLCs, processors and devices for communication.

One of the main characteristics of the DeviceNet network is that it uses the so-called CAN - Controller Area Network to transmit and receive telegrams. The CAN bus is composed of a pair of wires that transmit a differential electrical signal, responsible for sending the communication signal to all devices connected to the bus.

The DeviceNet protocol is an open protocol, and it is possible to obtain any information about this technology to develop devices for communication. Currently, ODVA (Open DeviceNet Vendor Association) is the organization that manages the specifications of the DeviceNet network for its development.

7.1.5.1 Baud rates and address

To set the baud rate and the address of the MVW01 on the network, the DeviceNet communication board has a set of eight switches, which have the following function:

Baud rate [kbits/s]	DIPs 1...2
125	00
250	01
500	10
Reserved	11

Address	DIPs 3...8
0	000000
1	000001
...	...
62	111110
63	111111

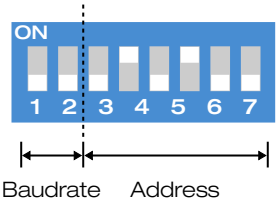


Figure 7.5: *Settings of the baud rate and address for DeviceNet*

The DeviceNet protocol defines three baud rates that can be used: 125, 250 and 500 Kbit/s. All devices connected to the network must be set to operate at the same baud rate. For the MVW01, this setting is done using switches 1 and 2 located on the communication board.

A device on the DeviceNet network can take the addresses from 0 (zero) to 63. For the MVW01, this setting is done using switches 3 to 8 located on the communication board. Each device on the network must have a different address from the others.

NOTE!
The baud rate and the address of the MVW01 on the network are only updated when the device is powered up. Therefore, if changes are made to those settings, the device must be turned off and back on.

7.1.5.2 LED indicators

The DeviceNet communication board has a set of four LEDs for device diagnostics. The description of each LED function is shown in Table 7.6 on page 7-10.

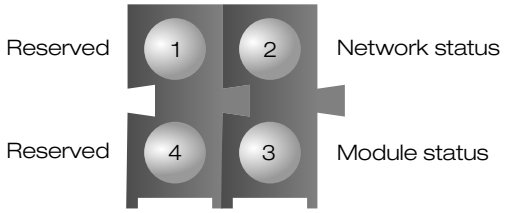


Figure 7.6: *LEDs for indicating the DeviceNet network status*

Table 7.6: *Network status LED indicators*

LED	Color	Function
Network Status	Green or red	**Off:** No power/offline **Green:** Online, connected **Red:** Fault **Flashing green:** Online, not connected **Flashing red:** Connection timeout
Module Status	Green or red	**Off:** No power/offline **Green:** Operating board **Red:** Fault **Flashing red:** Manageable fault

LED 3 provides information about the communication board only, and its normal state should be solid green. LED 2 provides information about the connection to the network, and whether the device is communicating with the master or not. Its normal state should be solid green. Variations in this LED may indicate problems in the connection with the bus or in the settings of the network master.

7.1.5.3 Connector and cables

The fieldbus kit for DeviceNet of the MVW01 has a female 5-way plug-in connector that must be used to connect to the bus. The pinout of this connector, as well as the standard color used in DeviceNet cables, follows the description of the following table.

Pin	Description	Color
1	V-	Black
2	CAN_L	Blue
3	Shield	
4	CAN_H	White
5	V+	Red

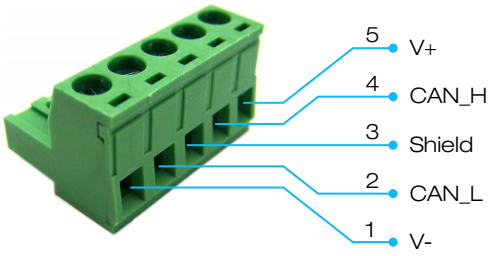


Figure 7.7: *Connector for the DeviceNet network*

To connect the various devices to the network, it is recommended to use a shielded cable with two twisted pairs: one pair of wires to transmit communication signals (CAN_L and CAN_H) and another for the power supply signal (V- and V+). Note that the maximum cable size allowed depends on the baud rate and the type of cable used. The following table shows the relationship between the baud rate used and the maximum cable length.

Table 7.7: *Maximum DeviceNet cable length*

Cable type	Baud rate		
	125 kbps	250 kbps	500 kbps
Thick cable	500 m	250 m	100 m
Thin cable	100 m	100 m	100 m
Maximum length per shunt	6 m	6 m	6 m
Maximum cumulative shunt length	156 m	78 m	39 m

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7.1.5.4 Bus power supply

As previously mentioned, one of the characteristics of the DeviceNet network is that the network cable itself must have a pair of wires to send a supply voltage to all devices connected to the bus. This voltage is used to feed the network interface circuit. For the communication board of the MVW01, the current and voltage data used to size the source are provided in the following table.

Supply voltage (Vdc)			Current consumption (mA)		
Minimum	Maximum	Recommended	Minimum	Maximum	Typical
11	25	24	-	30	25

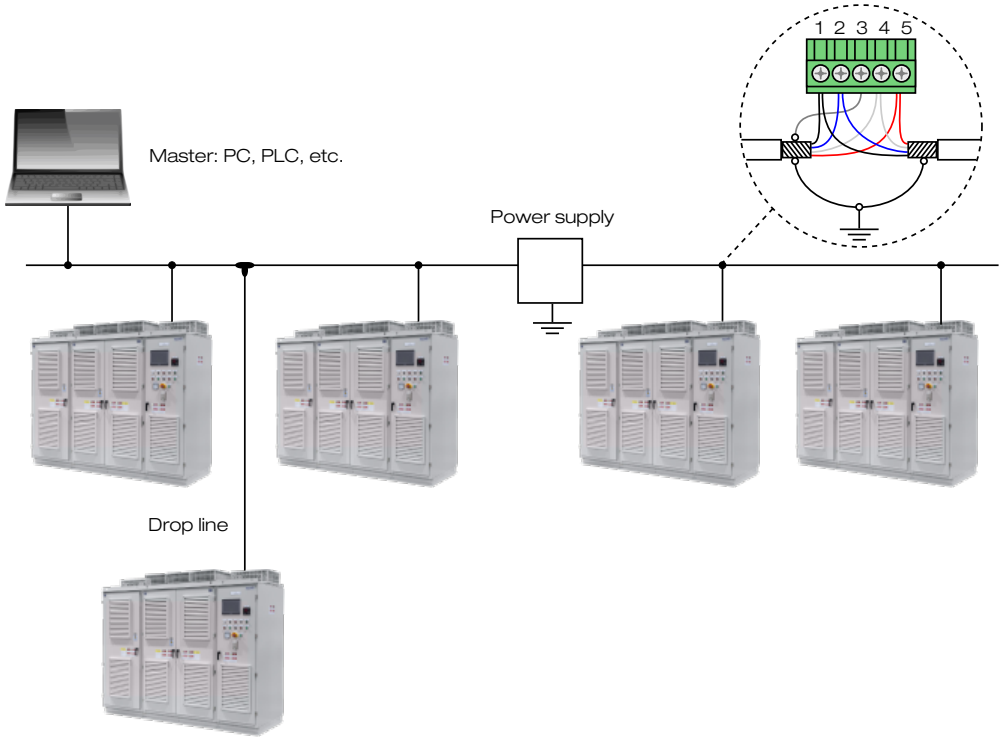


Figure 7.8: *MVW01 on DeviceNet network*

The DeviceNet network cable must be routed separately (and if possible distant) from the power supply cables. All drives must be properly grounded, preferably on the same connection with the ground. The shield of the DeviceNet cable must be grounded at a single point near the source that supplies power to the bus.

7.1.5.5 Termination resistors

For the DeviceNet network, it is necessary to install 121Ω/0.25 W termination resistors at the ends of the main bus. Each resistor must connect the CAN_H and CAN_L signals (pins 2 and 4 of the connector), and they may be placed on the connector that connects the device to the network.

7.1.5.6 Data types

The DeviceNet network allows different connections types to exchange data between the network master and other devices. For the MVW01, the connection types available to transmit I/O data depend on the communication kit used:

- DeviceNet fieldbus kit: only Polled messages can be communicated.
- DeviceNet Drive Profile fieldbus kit: Polled or Change of State & Cyclic messages can be communicated.

Those connection types are set using a configuration tool of the DeviceNet network master, so that the MVW01 can communicate correctly with the master. The amount of data that must be set depends on the value set at parameter P0309 (Fieldbus).

7.1.5.7 Configuration file (EDS file)

Every element of the Profibus DP network has an associated configuration file with EDS extension. This file describes the features of each device, and it is used by the configuration tool of the Profibus DP network master. When setting the master, the EDS configuration file, supplied with the device, must be used.

The EDS file to be used also depends on the communication kit used:

- DeviceNet fieldbus kit: you must use the EDS file provided in the ”DeviceNet” directory, on the CD-ROM that comes with the product. For this kit, the product will not be recognized as MVW01 but as “AnyBus-S DeviceNet” in the “Communications Adapter” category.
- DeviceNet Drive Profile fieldbus kit: you must use the EDS file provided in the “DeviceNet Drive Profile” directory on the CD-ROM that comes with the product. It is important to check the software version of the MVW01, which must match the version indicated in the EDS file name.

7.1.5.8 Parameter setting via Acyclic Data

The DeviceNet Drive Profile fieldbus kit, in addition to the I/O data communicated cyclically with the master, also allows setting the parameters of the MVW01 through acyclic data. The EDS file for this communication kit provides information about the parameters of the device and can be used by a commissioning tool to view or edit the value of the parameters. To that end, it is important to check the software version of the MVW01, which must match the version indicated in the EDS file name.

7.1.6 Ethernet

Ethernet/IP (Industrial Ethernet Protocol) is a communication system suitable for industrial environments. This system allows exchanging critical or time-restricted application data between industrial devices. Ethernet/IP is available for both simple devices such as sensors/actuators and complex devices such as robots, welders, PLCs, HMIs and drives.

EtherNet/IP uses CIP (Common Industrial Protocol) at the application layer. This is the same protocol used by DeviceNet™ and ControlNet™, which arranges the devices as a set of objects and defines methods and procedures for data access. In addition, it uses the standard IEEE 802.3 Ethernet at the lower layers and the TCP/IP and UDP/IP protocols at the intermediate layers to carry CIP packets.

Therefore, the infrastructure used by Ethernet/IP is the same as the one used by corporate Ethernet computer networks. This fact considerably expands the control and monitoring methods of devices connected to the network, such as:

- Availability of application protocols (HTTP, FTP, etc.).
- Integration of the industrial network from the production line to the office network.
- It is based on a widely spread and accepted standard.
- Greater data flow than the protocols normally used in industrial automation.

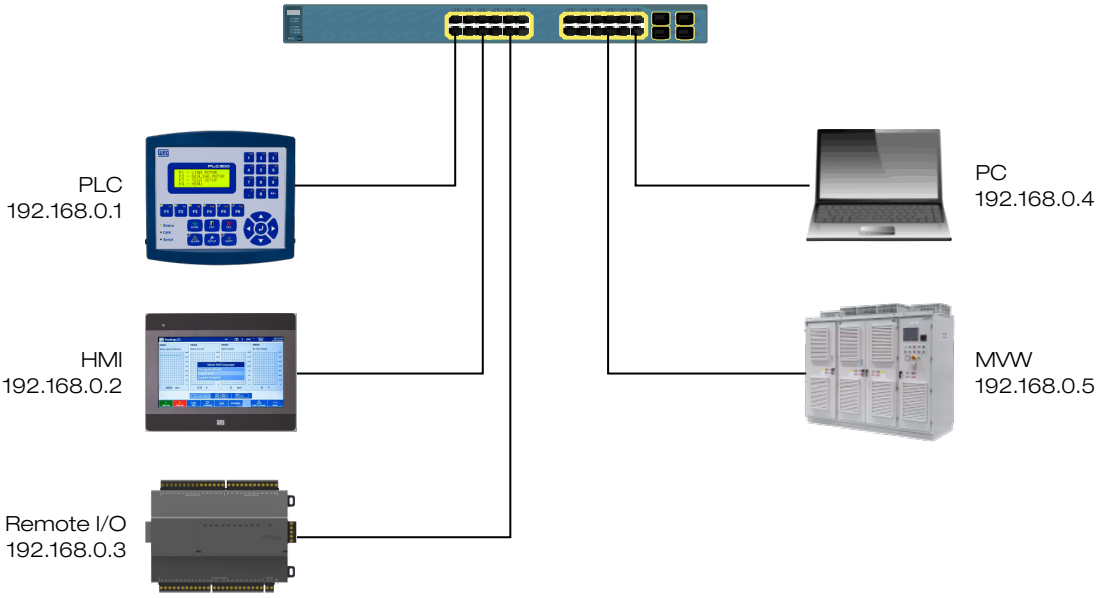


Figure 7.9: *Example of an Ethernet network*

7.1.6.1 Connector

7

Connector: socket for 8-way RJ-45 plug.

Pinout: there are two patterns for straight-through Ethernet cables: T-568A and T-568B. The cable to be used must follow one of these two standards. In addition, a single standard should be used to make the cable. That is, the plugs at the ends of a cable must be crimped according to standard T-568A or T-568B.

RJ-45 Plug T-568A Standard

Pin	Wire color	Signal
1	White/Green	TX+
2	Green	TX-
3	White/Orange	RX+
4	Blue	-
5	White/Blue	-
6	Orange	RX-
7	White/Brown	-
8	Brown	-

RJ-45 Plug T-568B Standard

Pin	Wire color	Signal
1	White/Orange	TX+
2	Orange	TX-
3	White/Green	RX+
4	Blue	-
5	White/Blue	-
6	Green	RX-
7	White/Brown	-
8	Brown	-

Figure 7.10: *Standards for Ethernet straight-though cables (Straight-Through)*

7.1.6.2 Line termination

In Ethernet 10BASE-T (10 Mbps) or 100BASE-TX (100 Mbps), the termination is already done on the communication board and also on any other device that uses peer-to-peer twisted pair. Therefore, no additional settings to the MVW01 are necessary.

7.1.6.3 Baud rate

the MVW01 can operate on Ethernet networks at rates of 10 Mbps or 100 Mbps and in half-duplex or full-duplex mode. When it operates at 100 Mbps full-duplex, the effective rate doubles to 200 Mbps. Those settings are made in the network configuration and programming software. No setting is required on the board.
It is recommended to use the autosensing function of those parameters.

7.1.6.4 Configuration file (EDS file)

Each device on an Ethernet/IP network is associated with an EDS file that contains information about its operation. This file provided with the product is used by the network configuration program.

7.1.6.5 Data settings

When setting the master, besides the IP address used by the EtherNet/IP board, it is necessary to indicate the number of I/O instances and the quantity of data exchanged with the master in each instance. For the MVW01 with Anybus-S Ethernet/IP board, the following values must be set:

- Input instance (input): 100
- Output instance (output): 150
- Quantity of data: programmable via P0309, which can be 2, 4 or 6 words of 16 bits (4, 8 or 12 bytes).
- The EtherNet/IP board is described on the network as Generic Ethernet Module. Using those settings, it is possible to set the master of the network to communicate with the MVW01.

7.1.6.6 LED indicators

The communication board has four bicolor LEDs grouped on the lower right corner that indicate the status of the module and Ethernet/IP network.

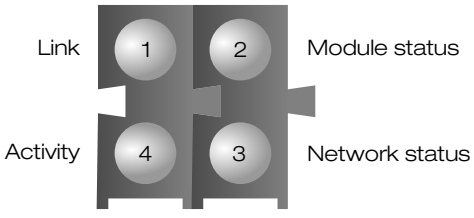


Figure 7.11: *LEDs for indicating the status of the Ethernet/IP network*

Table 7.8: Network status LED indicators

LED	Color	Function
Link	Green	**Off:** Not connected **On:** Connected
Module status	Green or red	**Off:** No power **Green:** Operating correctly **Red:** Fault **Flashing green:** Module not set, or network master in IDLE **Flashing red:** Manageable fault **Flashing green/red:** running self-diagnosis
Network status	Green or red	**Off:** No power/IP address not set **Green:** Ethernet/IP connection established **Red:** Duplicate IP address **Flashing green:** No connections allocated **Flashing red:** Timeout **Flashing green/red:** running self-diagnosis
Activity	Green	**Flashing green:** Receiving and/or transmitting

NOTE!
The communication board that comes with the product was developed by the company HMS Industrial Networks AB. Therefore, in the network configuration software the product will not be recognized as MVW01, but as “Anybus-S Ethernet/IP” in the category “Communication Adapter”.
The distinction will be based on the device address on the network.

7.1.6.7 WEB control and monitoring

The Ethernet/IP communication board has an internal HTTP server. This means that it is capable of serving HTML pages. Thus, you can set network parameters, control and monitor the MVW01 through a WEB browser installed on a computer on the same network as the drive. This operation is done using the same reading/writing variables of the MVW01 ; (see Section 7.1.9 Operation via network on page 7-24).

NOTE!
For the first access via WEB, use the factory default username and password.
Username: web
Password: web.

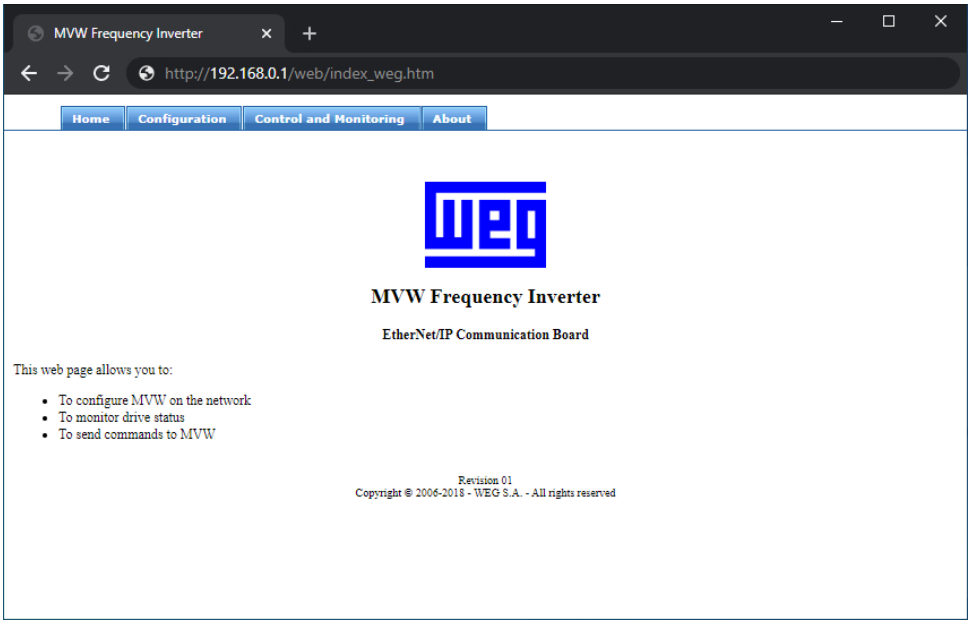


Figure 7.12: *WEB input screen*

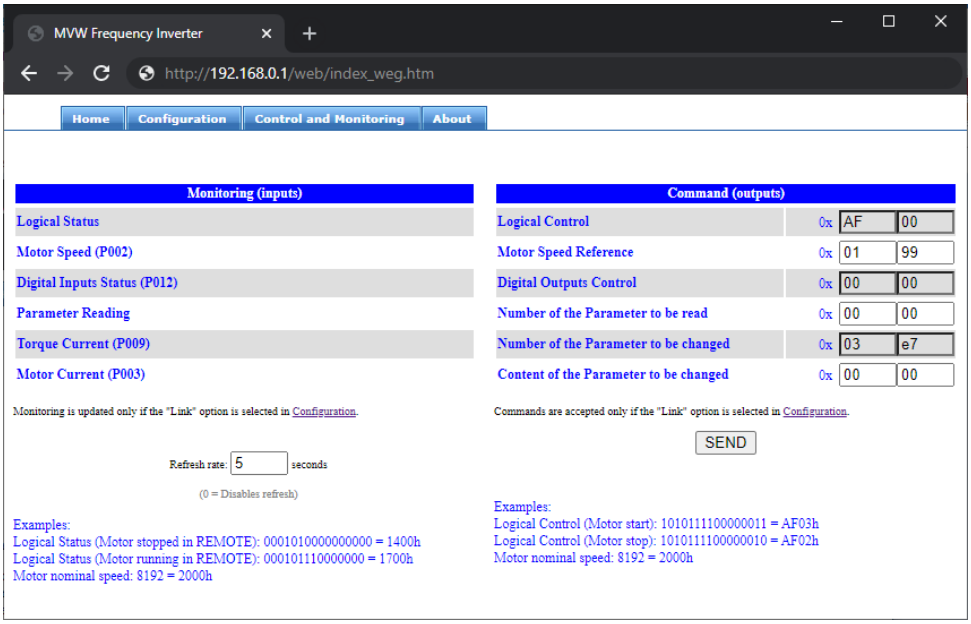


Figure 7.13: *WEB input screen*

NOTE!
A PC with an Ethernet board connected to the same network as the MVW01 and an Internet browser (MS Internet Explorer or Mozilla/Firefox) are required.
For better compatibility, it is recommended to use the Internet Explorer browser version 8 or earlier.

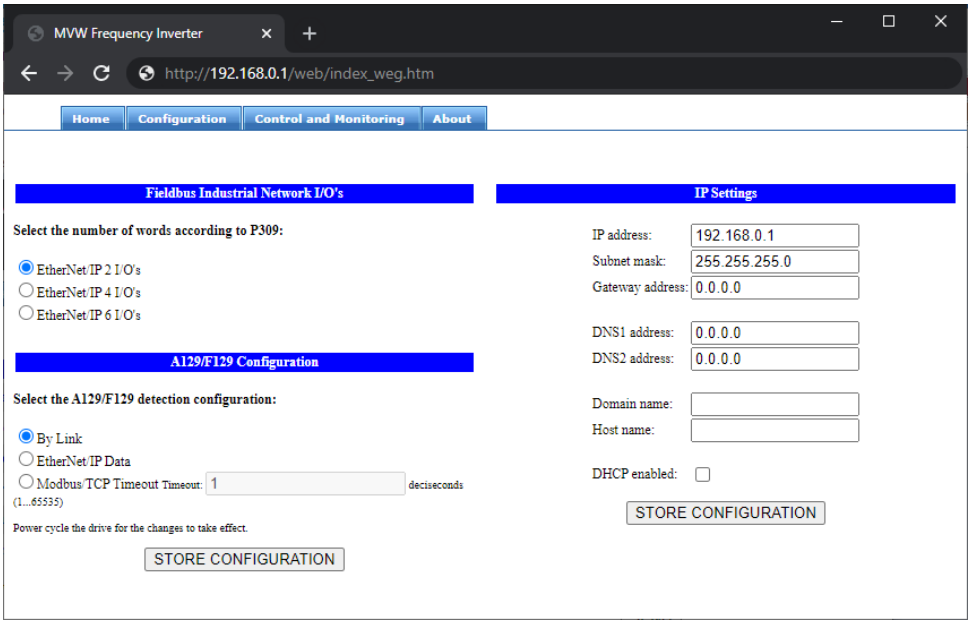
7.1.6.8 Settings

To operate the MVW01 on an Ethernet/IP network, follow the steps below:

1. Install the KFB-ENIP kit on the MVW01.
2. Using parameter P0309, select the Ethernet protocol and the number of input/output words.

3. Connect the RJ-45 plug of the Ethernet network cable to the MVW01 and make sure the Link indicator LED is lit (LED 1).
4. Open the browser and enter the address of the MVW01 on the network – the factory default is 'http://192.168.0.1'. Make sure your browser supports javascript and cookies enabled.
5. On the 'configuration' tab of the displayed web page, set the network parameters in 'Network Parameters' if necessary.
   (a) If the address of the MVW01 on the network belongs to the reserved range '192.168.0.X', use the board dip-switch for addressing. In this case, the switch represents the binary value of the last byte of the address.
   Example:

   The dip-switch above is set to 0001 0100 (20 in decimal).
   Therefore, the address of the MVW01 on the network is 192.168.0.20.
   (b) If the MVW01 has an IP address different from the default range (192.168.0.X), disable the hardware addressing via dip-switch by placing it in the zero position (00000000).
   (c) If the network addressing is done through a DHCP server, check the 'DHCP enabled' box and set the dip-switch position to zero (00000000).
   (d) Click on the 'STORECONFIGURATION' button to save the settings.



6. Also set the content of parameter P0309 (Fieldbus).
   (a) For the Online/Offline status modification to be effected when the Link status changes, select the 'Link' option.
   (b) For the Online/Offline status modification to be effected when there are no telegrams being exchanged with the Ethernet/IP master, select the 'EtherNet/IP' option.
   (c) For the Online/Offline status modification to be effected when there are no telegrams in the MVW01 being exchanged with the Modbus master for a certain time, select the 'Modbus' option and set the Timeout according to the application.
   (d) Click on the 'STORECONFIGURATION' button to save the settings.

Restart the MVW01.

7.1.6.9 Communication board access

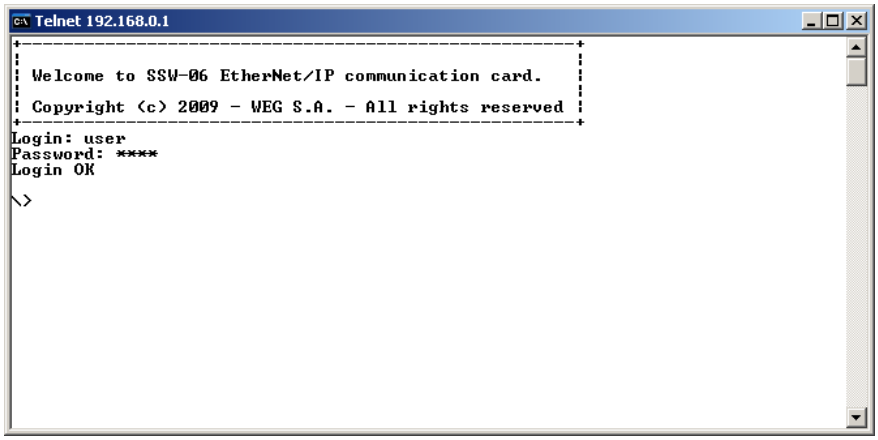
The communication board allows access via FTP and Telnet. Thus, you can transfer files to/from the board and also access the file system in an interactive way.

To use such services, proceed as follows:

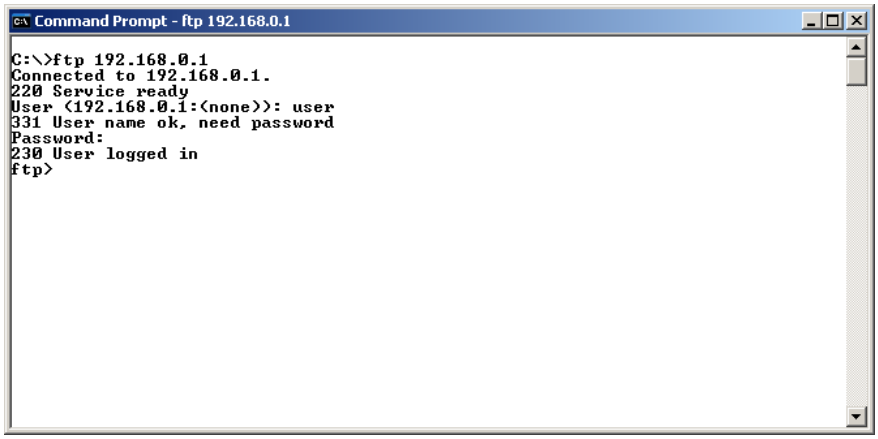
- Open an MS-DOS command window.
- Enter the desired service (FTP or Telnet) followed by the IP or hostname of the MVW01 on the network.
- Enter: Username: **user** Password: **user**

Examples:

Telnet session to the MVW01 whose IP address is 192.168.0.1



FTP session for the MVW01 whose IP address is 192.168.0.1



7.1.6.10 Security and access passwords

The communication board file system has two security levels for the users; **admin** and **normal**.

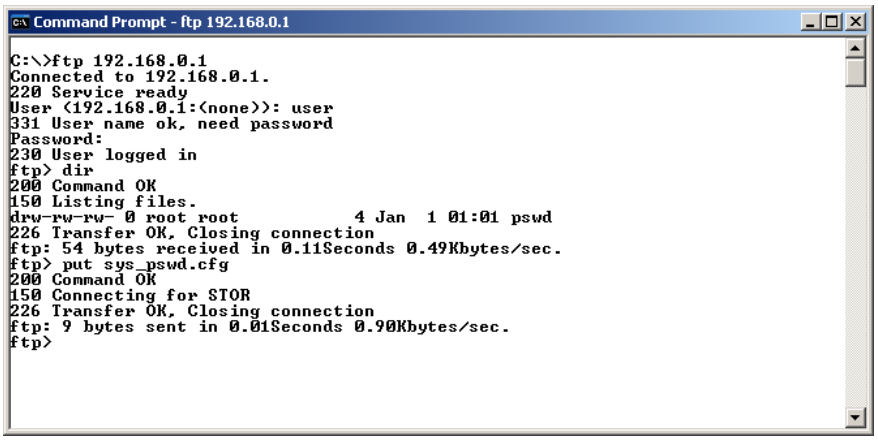
It is allowed to connect in normal mode only. In this case, the users are restricted to the directory 'user\',where it is possible to create or delete files and/or folders. The accounts of users of this level defined in the file 'sys_pswd.cfg' that is located under directory 'user\pswd\'. Each line in this file contains a 'login: password' pair that corresponds to a user account.

To change it, create, with a simple text editor (Windows Notepad, for example), a file that contains a 'login: password' pair in each line. The two words must be separated by a colon.

Note that there is no password encryption mechanism, that is, both the login and the password are in plain text.

After creating/modifying the user accounts, transfer via FTP the file 'sys_pswd.cfg' to the directory 'user\pswd\'.

Example of file transfer via FTP:



7

NOTE!
The MVW01 leaves the factory set with a normal user account:
Username: user Password: user
Users of the **normal** security level are restricted to the directory **'\user'**.

In addition to the control for accessing the file system, there is also a password for accessing the HTML pages of the communication board. The file containing the access passwords is located under the directory 'user\pswd', and it is named 'web_accs.cfg'. As with other passwords, each line in the file represents an account for access. To change it, create a text file with the same name containing a 'login: password' pair in each line. Then transfer this new file via FTP to the communication board, exactly as in the previous case.

NOTE!
After the equipment start-up period, it is recommended to change all passwords on the Ethernet/IP communication board. The new passwords will only take effect after the MVW01 is powered up again. When the MVW01 returns from the offline state, the output values are reset to zero.

7.1.7 Modbus/TCP

Modbus is a data communication protocol used in industrial automation systems. Created in the 1970s by Modicon, it is one of the oldest protocols used in networks for supervision and control of automation equipment.

The Modbus/TCP protocol is an implementation of the Modbus standard over TCP/IP enabling the use of the ModBus message system on an 'Intranet' or 'Internet' network. Modbus/TCP basically encapsulates a Modbus frame in a TCP frame in a simple way.

Modbus/TCP uses the physical medium Ethernet (IEEE 802.3) and the client-server model. The infrastructure used is the same as that used by corporate Ethernet computer networks. This fact considerably expands the control and monitoring methods of devices connected to the network.

The Ethernet/IP board for the MVW01 has a Modbus/TCP server that provides access to the Input and Output

areas through a set of functions defined in the Modbus/TCP specification. All messages use TCP port 502 and the Modbus/TCP server can manage a maximum of 8 simultaneous connections.

The following items for the Modbus/TCP protocol are similar to that described for the Ethernet/IP protocol:

Description	Refer to section:
Connector	Section 7.1.6.1 Connector on page 7-14
Line termination	Section 7.1.6.2 Line termination on page 7-15
Baud rate	Section 7.1.6.3 Baud rate on page 7-15
LED indicators	Section 7.1.6.6 LED indicators on page 7-15
WEB control and monitoring	Section 7.1.6.7 WEB control and monitoring on page 7-16
Settings	Section 7.1.6.8 Settings on page 7-17
Communication board access	Section 7.1.6.9 Communication board access on page 7-19

7.1.7.1 Data Settings for the Network Master

To use the Modbus/TCP protocol of the Ethernet/IP communication board, it is necessary to set the amount of data exchanged with the master.

For the MVW01 with Anybus-S Ethernet/IP board, the quantity of data is programmable through P0309, which can be 2, 4 or 6 16-bit words (4, 8 or 12 bytes).

The mapping of the I/O words in the Modbus protocol is shown in the table below:

Table 7.9: *Addressing map*

Area	Register	I/O word
Input data	1	1st WORD
	2	2nd WORD
	3	3rd WORD
	4	4th WORD
	5	5th WORD
	6	6th WORD
Output data	1025	1st WORD
	1026	2nd WORD
	1027	3rd WORD
	1028	4th WORD
	1029	5th WORD
	1030	6th WORD

NOTE!

- The table above applies to all function codes.
- Coils are mapped with MSB first, e.g.: coil #1 corresponds to bit 15 of register #1.
- I/O words are represented in registers with the least significant byte first.

Thus, it may be necessary to replace the most significant byte with the least significant byte so that the words are interpreted correctly by the network master.

- Some *Clients* employ offset in the register address.

Several Modbus functions may be used to access the same data area on the module. Below are the functions available for the Ethernet/IP module:

Table 7.10: Supported function codes

Modbus function	Function Code	Associated with:
Read Coil	1	Input and output data
Read Input Discrete	2	
Read Multiple Registers	3	
Read Input Registers	4	
Write Coil	5	Output data
Write Single Register	6	
Force Multiple Coils	15	
Force Multiple Registers	16	
Mask Write Register	22	
Read/Write Registers	23	Input and output data

Table 7.11: Supported error codes

Code	Name	Description
0x01	Illegal function	Function code is not supported
0x02	Illegal data address	Address outside the initialized memory area
0x03	Illegal data value	Illegal value

7.1.8 Profinet

7

7.1.8.1 Connector

Connector: socket for 8-way RJ-45 plug.

Pinout: there are two patterns for straight-through Ethernet cables: T-568A and T-568B. The cable to be used must follow one of these two standards. In addition, a single standard should be used to make the cable. That is, the plugs at the ends of a cable must be crimped according to standard T-568A or T-568B.

RJ-45 Plug T-568A Standard

Pin	Wire color	Signal
1	White/Green	TX+
2	Green	TX-
3	White/Orange	RX+
4	Blue	-
5	White/Blue	-
6	Orange	RX-
7	White/Brown	-
8	Brown	-

RJ-45 Plug T-568B Standard

Pin	Wire color	Signal
1	White/Orange	TX+
2	Orange	TX-
3	White/Green	RX+
4	Blue	-
5	White/Blue	-
6	Green	RX-
7	White/Brown	-
8	Brown	-

Figure 7.14: *Standards for Ethernet straight-though cables (Straight-Through)*

7.1.8.2 Baud rate

The Ethernet interface of the MVW01 for the PROFINET IO protocol can communicate using the 100 Mbps rate in full duplex mode, as required by the protocol.

7.1.8.3 Configuration file (GSDML file)

Each device on a PROFINET network is associated with a GSDML file that contains information about its operation. This file provided with the product is used by the network configuration program.

7.1.8.4 Station name

A name must be assigned to each device on the PROFINET IO network. Such name, which is stored in the communication accessory itself, is used to identify and address the device on the network. For the MVW01, this name must be assigned via the PROFINET network master configuration tool.

7.1.8.5 Data settings

To set the master, in addition to the Station Name used by the PROFINET board, it is necessary to indicate the amount of data exchanged with the master. For the MVW01 with Anybus-S PROFINET board, the following values must be set:

- Number of data: programmable via P0309, which can be 2, 4 or 6 words of 16 bits (4, 8 or 12 bytes). This number of words must also be set in the network configuration tool, using the GSDML configuration file, and selecting the input and output modules necessary to compose the number of words as set in P0309.
- The PROFINET board for the MVW01 is identified on the network as Anybus-S PRT. Using those settings, it is possible to set the master of the network to communicate with the MVW01.

7.1.8.6 LED indicators

The communication board has four bicolor LEDs grouped on the lower right corner indicating the status of the module and of the Ethernet/IP network

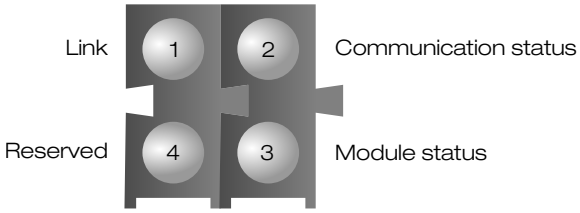


Figure 7.15: *PROFINET network status LED indicators*

Table 7.12: Supported function codes

LED	Color	Function
Link	Green	**On:** Link established **Flashing:** Receiving/transmitting data **Off:** No link or not powered
Communication status	Green	**On:** On line, RUN. Connection to controller established **Flashing:** On line, STOP. Connection to controller established **Off:** Off line. No connection to the controller
Module status	Green or red	**Off:** Module not powered or not initialized **On green:** Initialized, no error **Flashing Green, 1 flash:** With diagnostic data **Flashing green, 2 flashes:** Blink function, used to identify slave on the network **Flashing Red, 1 flash:** Configuration error. Incorrect module or incorrect number of configured I/O words **Flashing Red, 3 flashes:** Station Name or IP Address has not been configured **Flashing Red, 4 flashes:** Internal error

7.1.9 Operation via network

Parameter P0309 allows setting the number of I/O words that will be exchanged with the network master. This item will present the data format for each of the existing options.

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Depending on the value selected in parameter P0309, the drive will communicate with the network master 2, 4 or 6 I/O words. The greater the number of words communicated via network, the more functions are available for operation of the MVW01, but both the amount of memory reserved in the master and the time required for communication will also be greater.

Input (drive → master):

Input	Description
1st word	Inverter logical status
2nd word	Motor speed
3rd word	Digital inputs DI1 to DI10 status
4th word	Content of the read parameter
5th word	Motor Torque
6th word	Motor Current

Output (master → drive):

Output	Description
1st word	Logical command
2nd word	Motor speed reference
3rd word	Digital outputs DO1 to RL5 status
4th word	Number of the parameter to be read
5th word	Number of the parameter to be changed
6th word	Content of the parameter to be changed

7.1.9.1 Input - 1st word: Inverter Logical Status

The word that defines the Logical Status consists of 16 bits, with 8 upper bits and 8 lower bits, having the following construction:

Table 7.13: Logical Status: Upper bits

Bit	Function	Description
15	Active fault	0 = No
		1 = Yes
14	PID controller	0 = Manual
		1 = Automatic
13	Undervoltage in the sources of the electronics	0 = Without undervoltage
		1 = With undervoltage
12	Local/Remote Command	0 = Local
		1 = Remote
11	Jog Command	0 = Inactive
		1 = Active
10	Direction of Rotation	0 = Reverse
		1 = Forward
09	General Enable	0 = Disabled
		1 = Enabled
08(*)	Run/Stop	0 = Stop
		1 = Run

Lower bits - indicate the fault code.
See Section 8 DIAGNOSTICS AND TROUBLESHOOTING on page 8-1 .

(*) Bit 08 = 1. It means the inverter received the run/stop command via networks. This EL is not intended to signal that the motor is effectively spinning.

7.1.9.2 Input - 2nd word: Motor speed

This variable is shown using 13-bit resolution plus signal. Therefore, the rated value will be equal to 8191 (1FFFh) (forward run) or -8191 (E001h) (reverse run) when the motor is spinning at synchronous speed (or base speed, for example 1800 rpm for a 4-pole, 60 Hz).

7.1.9.3 Input - 3rd word: Status of digital inputs

Indicates the content of parameter P0012 (Digital inputs DI1 to DI10 status).

The digital inputs of this WORD are distributed as follows:

Table 7.14: Status of digital inputs

Bit	Function	Description
9	DI10	0 = Inactive 1 = Active
8	DI09	0 = Inactive 1 = Active
7	DI01	0 = Inactive 1 = Active
6	DI02	0 = Inactive 1 = Active
5	DI03	0 = Inactive 1 = Active
4	DI04	0 = Inactive 1 = Active
3	DI05	0 = Inactive 1 = Active
2	DI06	0 = Inactive 1 = Active
1	DI07	0 = Inactive 1 = Active
0	DI08	0 = Inactive 1 = Active

7.1.9.4 Input - 4th word: Content of the parameter to be read

This position allows reading the content of the inverter parameters, which are selected in position 4. Number of the parameter to be read, of the “Variables Written on the Inverter”. The values read will have the same order of magnitude as those described in the product manual or shown on the HMI.
Values are read without the decimal point, when applicable.

Examples:
a) HMI indicates 12.3, and the reading via Fieldbus will be 123.
b) HMI indicates 0.246 and the reading via Fieldbus will be 246.

7.1.9.5 Input - 5th word: Torque on the motor

Indicates the content of parameter P0009, disregarding the decimal point. This variable is filtered by a low-pass filter with a 0.5 s time constant.

7.1.9.6 Input - 6th word: Motor current

Indicates the content of parameter P0003, disregarding the decimal point. This variable is filtered by a low-pass filter with a 0.3 s time constant.

7.1.9.7 Output - 1st word: Logical Command

This word is transmitted from the network master to the MVW01, in the first position of the output data, allowing the control of the main functions of the device. It has 16 bits, which can be divided into two bytes for a better understanding of the command:

Most significant byte: acts as the command mask. Each bit enables the execution of a command, and the effective value of the command is transmitted in the corresponding least significant bit.

Table 7.15: Logical Command - Upper bits

Bit	Function
15	Inverter fault reset
14	Not used
13	Save changes of parameter P169/P170 to the EEPROM
12	Local/Remote Command
11	Jog Command
10	Direction of Rotation
09	General Enable
08	Run/Stop

Least significant byte: has the effective value for each command you want to execute. Each bit is responsible for executing a command, but the command will only be executed if the corresponding upper bit is set to 1. If the mask bit is not set to 1, the value received in the corresponding lower bit is disregarded.

Table 7.16: Logical Command - Lower bits

Bit	Function	Description
7	Inverter fault reset(*)	0 = No 0 → 1 = Reset
6	Not used	- -
5	Save changes of parameter P169/P170 to the EEPROM	0 = Save 1 = Not save
4	Local/Remote Command	0 = Local 1 = Remote
3	Jog Command	0 = Inactive 1 = Active
2	Direction of Rotation	0 = Reverse 1 = Forward
1	General Enable	0 = Disabled 1 = Enabled
0	Run/Stop	0 = Stop 1 = Run

NOTE! Logic command Bit 13:
The function to save changes in the content of the parameters to the EEPROM occurs normally when using the HMI. The EEPROM supports a limited number of writings (100,000). In applications where the speed regulator is saturated and you want to control the torque, you must act on the current limitation value P0169/P0170 (valid for P0202 > 2).
When the Network Master writes on P0169/P0170 continuously, you must prevent the changes from being saved on the EEPROM, doing the following: Bit 13 = 1 and Bit 5 = 1.

7.1.9.8 Output - 2nd word: Motor speed reference

This variable is displayed using a 13-bit resolution. Therefore, the speed reference value for the motor synchronous speed will be equal to 8191 (1FFFh).

NOTE!
Values above 8191 (1FFFh) are allowed when it is desired to obtain values above the motor synchronous speed, as long as they respect the value set for the inverter maximum speed reference.

7.1.9.9 Output - 3rd word: Command for digital outputs

It allows changing the status of the digital outputs set for Fieldbus in parameters P0275 to P0282. The word that defines the state of the digital outputs is formed by 16 bits, with the following construction:

Table 7.17: *Command of the digital outputs - Upper bits*

Bit	Function
8	DO1 output control
9	DO2 output control
10	RL1 output control
11	RL2 output control
12	RL3 output control
13	RL4 output control
14	RL5 output control

Table 7.18: *Command of the digital outputs - Lower bits*

Bit	Function	Description
0	DO1 output command	0 = Inactive output 1 = Active output
1	DO2 output command	0 = Inactive output 1 = Active output
2	RL1 output command	0 = Inactive output 1 = Active output
3	RL2 output command	0 = Inactive output 1 = Active output
4	RL3 output command	0 = Inactive output 1 = Active output
5	RL4 output command	0 = Inactive output 1 = Active output
6	RL5 output command	0 = Inactive output 1 = Active output

7.1.9.10 Output - 4th word: Number of the parameter to be read

Through this position it is possible to read any parameter of the inverter. The number corresponding to the desired parameter must be provided, and its content will be shown in position 4 of the “Inverter variables read”.

7.1.9.11 Output - 5th word: Number of the parameter to be changed

This position works together with the *Output - 6th word*.
If you do not want to change any parameters, the 999 code must be placed in this position.

During the modification process, you must:

- Keep code 999 in position 5.
- Replace code 999 with the number of the parameter to be changed.
- If no error code (124 to 127) is signaled in the Logical Status, replace the parameter number with code 999 to end the modification.

The modification can be checked via HMI or by reading the parameter content.

NOTE!

- The command to switch from scalar to vector control will not be accepted if any of parameters P0409 to P0413 are set to zero. This must be done via HMI.
- Do not set P0204 = 5 since in the factory settings P0309 = Inactive.
- P0204 and P0408 do not accept command modifications via networks.
- The desired content must be maintained by the master for 15.0 ms.
  Only after this time has elapsed can a new value be sent or written to another parameter.

7.1.9.12 Output - 6th word: Content of the parameter to be changed

Value for the parameter selected in *Output - 5th word*: (write the value without the decimal point).

NOTE!
When parameters P0409 to P0413 are changed, slight differences in content may arise due to truncation (rounding) during the reading process.

7.2 SERIAL

This chapter provides the necessary information for the operation of the MVW01 via serial communication.

CAUTION

- Carefully follow the cautions and safety warnings contained therein.
- When there is a possibility of damage to people or equipment related to motors driven by the inverter, provide electromechanical safety devices.

ATTENTION

- Carefully follow the precautions defined in this manual regarding the interconnection cables of the two interfaces for serial communication.
- Equipment with components sensitive to static electricity. Electronic boards must be handled with the following care:
  - Do not directly touch with the hands the component parts or connectors. When necessary, first touch a grounded metallic object.
  - Use weld iron with a grounded tip.

TERMS USED

- **Parameters:** Are those existing on the drive and which can be viewed and changed via human-machine interface (HMI).
- **Basic variables:** Internal values of the MVW01 that can only be accessed through the serial, used to monitor the device status, commands and identification.
- **Registers:** These are internal memory addresses of the MVW01. Can be used to represent both basic variables and parameters.
- **EEPROM:** It is the non-volatile memory that allows the MVW01 to maintain parameter values even after the device is turned off.

NUMERICAL REPRESENTATION:

- Decimal numbers are represented by means of digits without suffix.
- Hexadecimal numbers are represented with the letter “h” after the number.

7.2.1 Introduction

The basic purpose of serial communication is the physical connection between two or more devices in a network configured as follows:

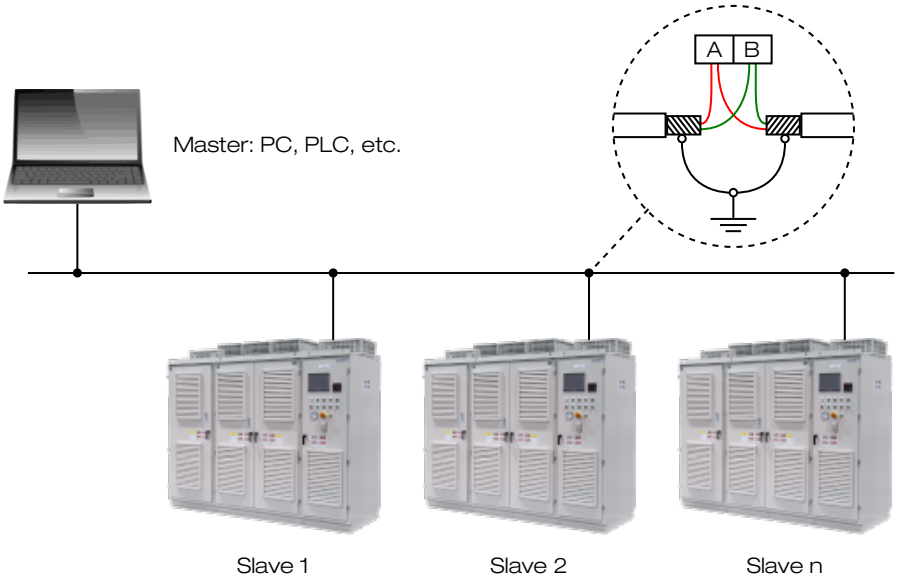


Figure 7.16: *Connection Diagram*

Using this interface, the network master can request several services from each slave connected to the network, such as:

- IDENTIFICATION:
  - Type of device (frequency inverter, servo drive, soft-starter)
  - Status monitoring
  - Reading of errors
- PARAMETER SETTING:
  - Reading of parameters (current, voltage, etc.)
  - Writing of parameters for the device configuration
- COMMANDS:
  - Enabling
  - Direction of rotation
  - Error reset

The MVW01 uses the Modbus-RTU protocol for communication via its serial interface. This protocol allows the integration of of the MVW01 into different systems, since it allows its connection to various devices, such as:

- PC (master) to set the parameters of one or several drives simultaneously.
- SDCD monitoring variables and parameters of the MVW01.
- PLC controlling the operation of the device in an industrial process.

7.2.2 Serial communication parameters

The parameters related to serial communication and operation via the Modbus-RTU protocol of the MVW01 will be described next.

P0308 - Serial address			
Adjustable range:	1 to 30	Factory setting:	1

Each slave on the network must have an address different from the others, so that the master can send the desired telegram to a specific slave on the network. This parameter allows setting address of the MVW01 on the network.

It is necessary to install a repeater for more than 30 devices on the same communication network.

P0312 - Type of serial protocol			
Adjustable range:	0 to 11	Factory setting:	7

The MVW01 has one of the following options for communication via the product serial interface:

P0312	Function
0	Reserved
1	Modbus-RTU, 9600 bps, no parity
2	Modbus-RTU, 9600 bps, odd parity
3	Modbus-RTU, 9600 bps, even par
4	Modbus-RTU, 19200 bps, no parity
5	Modbus-RTU, 19200 bps, odd parity
6	Modbus-RTU, 19200 bps, even par
7	Modbus-RTU, 38400 bps, no parity
8	Modbus-RTU, 38400 bps, odd parity
9	Modbus-RTU, 38400 bps, even par

It is necessary that all devices operating on the same network have the same communication settings.

P0313 - Action for communication error			
Adjustable range:	0 to 5	Factory setting:	0

Table 7.19: *Communication error action*

P0313	Function
0	Stop by ramp
1	General disable
2	No action
3	Go to LOC
4	Reserved
5	Fault

- **0 - Ramp stop**: It disables the motor by deceleration ramp in case of a communication error.
- **1 - General disable**: In this option, the MVW01 cuts off the power to the motor, which should coast to a stop.
- **2 - No action**: if one of the errors previously mentioned occurs, the drive remains in its current state and only indicates the error.
- **3 - Change to LOC**: If you are operating in REMOTE mode, and a communication error occurs, it will automatically go to LOCAL mode.
- **5 - Fault**: Upon detecting a communication fault, it will go to the error state, the motor will be disabled, and the error indication will only be removed after resetting the device errors.

Only the timeout receiving telegrams error is considered a communication error. The timeout receiving telegrams is set through parameter P0314.

NOTE!
The *Ramp stop* and *Change to LOC* commands can only be executed if they are being controlled via fieldbus. This setting is done through parameters P0220 (LOCAL/REMOTE selection source), P0224 (Start/Stop Selection LOCAL Situation) and P0227 (Start/Stop Selection REMOTE Situation).

P0314 - Time for serial watchdog action			
Adjustable range:	0,0 to 999,0 s	Factory setting:	0,0 s

It allows setting the time for detecting timeout when receiving telegrams. Value 0 (zero) disables this function.

If the drive is controlled via serial, and a problem communicating with the master occurs (cable break, power failure, etc.), it will not be possible to send a command via serial to disable the device. In applications where that is a problem, it is possible to set a maximum interval in P0314 within which the MVW01 must receive a valid serial telegram, otherwise it will consider that the serial communication has failed.

Once that time has been set, if it does not receive valid serial telegrams within the time set, it will display E28 and take the action set in P0313. If the communication is reestablished, the timeout receiving telegrams indication will be removed.

P0220 - LOCAL/REMOTE selection source
P0221 - Speed reference selection LOCAL situation
P0222 - Speed reference selection REMOTE situation
P0223 - Forward/Reverse Selection LOCAL Situation
P0224 - Start/Stop Selection LOCAL Situation
P0225 - Selection of JOG Source LOCAL Situation
P0226 - Selection of Direction of ROTATION REMOTE Situation
P0227 - Start/Stop Selection REMOTE Situation
P0228 - JOG Selection - REMOTE Situation

These parameters define the source of commands and references for the inverter in the LOCAL and REMOTE modes.
For the commands that will be controlled via network, set it in the “Serial” option.

P0275 - DO1 Function
P0276 - DO2 Function
P0277 - RL1 Function
P0279 - RL2 Function
P0280 - RL3 Function
P0281 - RL4 Function
P0282 - RL5 Function

These parameters define the function of the inverter digital outputs.
For the digital outputs that will be controlled via network, set it in the “Serial” option.

7.2.3 Interface

The MVW01 frequency inverters operate as slaves to the Modbus-RTU network, and every communication starts with the master of the Modbus-RTU network requesting some service from an address on the network.

If the inverter is configured for the corresponding address, it processes the request and responds what was requested to the master.

NOTE!

- Power and control cables with a voltage of 110 V/220 V must be separated from the Serial RS-232 wiring.
- It is not possible to use RS-232 and RS-485 simultaneously.

7.2.3.1 RS-232

The MVW01 has an RS-232 serial port (X7 connector on the MVC4 board) available.

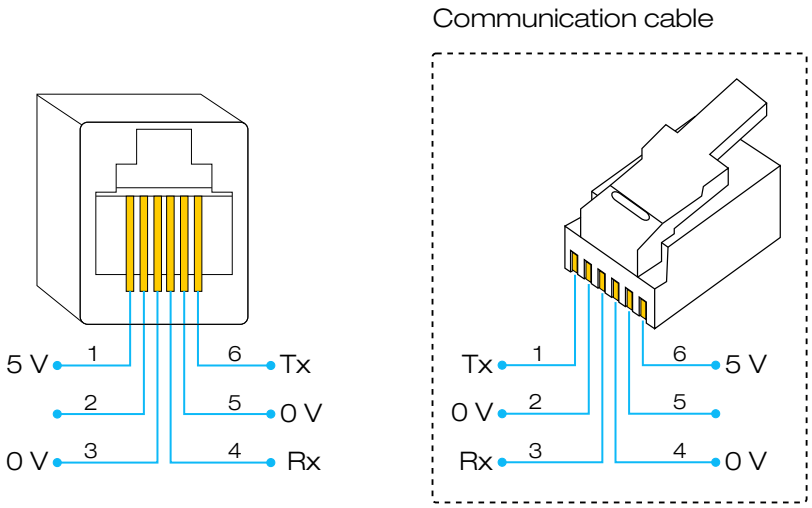


Figure 7.17: *Description of the XC7 connector signals (RJ11)*

This interface allows connecting a master to a MVW01 (peer-to-peer) up to 10 m distant. For communication with the master, one wire for transmission (TX), one for reception (RX) and a reference (0 V) must be used, signals which are present on pins 4, 5 and 6. The signals present on pins 1, 2 and 3 are on this connector for external power supply, used as one of the options for RS-485 communication.

7.2.3.2 RS-485

In addition to the EBB board, the CSI2 board (15423438 code) on the XC9 connector of the MVC4 board can be used as an RS-485 interface on the MVW01:

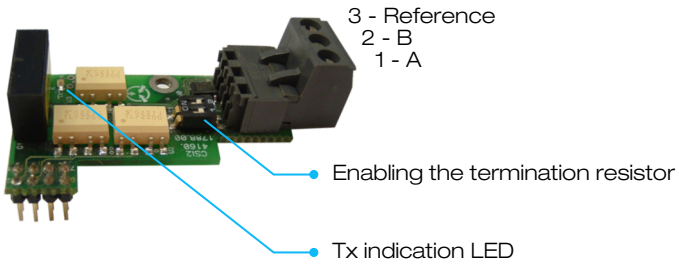


Figure 7.18: *CSI2 Board*

Using the RS-485 interface, the master can control several drives connected to the same bus.
The Modbus-RTU protocol allows the connection of up to 247 slaves (1 per address), provided that signal repeaters are also used along the bus. This interface has good noise immunity, and the maximum cable length allowed is 1000 meters.

The following recommendations must be observed when installing the network using this interface:

- Generally, a shielded twisted pair is used to transmit signals B and A. Those signals must be connected to terminals 1 and 2 of the board.
- Terminal 3 is used to connect the reference signal to the RS-485 circuit. If this signal is not used, this connection can be disregarded.
- It is very important to correctly ground all devices connected to the RS-485 network, preferably at the same grounding point. The cable shield must also be grounded, and for that purpose, the shield can be connected somewhere to the frame of the MVW01.
- The cable must be routed separately and, if possible, distant from the power supply cables.
- Termination resistors must be provided on the first and last devices connected to the main bus. The interface board for RS-485 CSI2 has switches for enabling this resistor. Just put both S1 switches to the “ON” position.

7.2.4 Accessible data

Various data can be accessed via the serial interface to enable their setting, command and monitoring. Basically, those data can be divided into two groups: basic parameters and variables.

7.2.4.1 Parameters

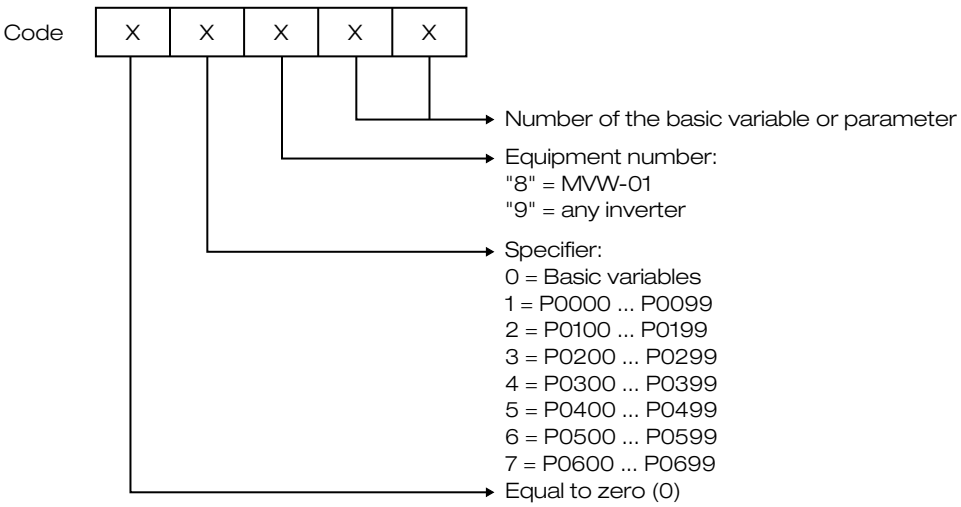
The parameters are those available through the MVW01 HMI. Virtually all drive parameters can be accessed via serial, and through those parameters it is possible to configure the way the device will operate and monitor information relevant to the application, such as current, voltage, errors, etc.

7.2.4.2 Basic variables

The basic variables are internal values of the MVW01 accessible only through the serial interface of the product. Using these variables, it is possible to monitor the states of the drive and send commands such as enable and reset.

Each basic variable represents a register (16 bits). For the MVW01, the following basic variables were provided:

V00 (address: 5000):
Inverter model indication (reading variable).
The reading of this variable allows identifying the inverter type. For the MVW01 this value is 8, as shown below:



V02 (address: 5002):
Inverter status indication (reading variable).
Logical status (byte-high). Error code (byte-low).

Where:
Logical Status:

	MSB							
Status word	15	14	13	12	11	10	9	8

- Bit 8: 0 = Enable by ramp (run/stop) inactive / 1 = Enable by ramp active.
- Bit 9: 0 = General enable inactive / 1 = General enable active.
- Bit 10: 0 = Reverse / 1 = Forward.
- Bit 11: 0 = JOG inactive / 1 = JOG active.
- Bit 12: 0 = Local / 1 = Remote.
- Bit 13: 0 = Without undervoltage / 1 = With undervoltage.
- Bit 14: 0 = Manual (PID) / 1 = Automatic (PID).
- Bit 15: 0 = Without fault / 1 = With fault.

V03 (address: 5003):
Selection of the logical command.
Writing variable, whose bits have the following meaning:

Upper bits: mask of the desired action. The corresponding bit must be set to 1 for the action to occur.

	MSB							
Logical command	15	14	13	12	11	10	9	8

- Bit 8: 1 = Enable ramp (run/stop).
- Bit 9: 1 = General Enable.
- Bit 10: 1 = Direction of rotation.
- Bit 11: 1 = JOG.
- Bit 12: 1 = Local/Remote Selection.
- Bit 13: Not used.
- Bit 14: Not used.
- Bit 15: 1 = Fault reset.

Lower bits: logical level of the desired action.

								LSB
Logical command	7	6	5	4	3	2	1	0

- Bit 0: 0 = Disable (stop) / 1 = Enable (run).
- Bit 1: 0 = General disable / 1 = General enable.
- Bit 2: 0 = Reverse / 1 = Forward.
- Bit 3: 0 = JOG inactive / 1 = JOG active.
- Bit 4: 0 = Local / 1 = Remote.
- Bit 5: Not used.
- Bit 6: Not used.
- Bit 7: 0 = Reset inactive. / 1 = Reset active.

NOTE!

- Disable via DIx has priority over these disabling actions.
- To enable the inverter via serial, it is necessary that CL0 = CL1 = 1 and that the external disable be inactive.
- If CL0 = CL1 = 0 simultaneously, general disable will occur.

V04 (address: 5004):
Speed reference given by the Serial (reading/writing variable).
It allows sending the reference to the inverter provided that P0221 = 9 for Local or P0222 = 9 for Remote; this variable has a 13-bit resolution.

V06 (address: 5006):
Status of the operating modes (reading variable).

								LSB
Operation modes	7	6	5	4	3	2	1	0

- Bit 0: 1 = Setting mode after reset to factory settings/first power-up.
- The inverter will go into this operating mode when it is powered up for the first time or when the factory settings of the parameters is loaded (P0204 = 5 or 6). In this mode, only parameters P0023, P0201, P0295, P0296, P0400, P0401, P0402, P0403, P0404 and P0406 will be accessible. If another parameter is accessed, the inverter will return A0125.
- Bit 1: 1 = Setting mode after changing from Scalar to Vector control.
- The inverter will go into this operating mode when the control mode is changed from Scalar (P0202 = 0, 1 or 2) to Vector (P0202 = 3 or 4). In this mode, only parameters P0023, P0201, P0295, P0296, P0400, P0401, P0402, P0403, P0404 and P0406 will be accessible. If another parameter is accessed, the inverter will return A0125.
- Bit 2: 1 = Performing Self-tuning.
- Bit 3: Not used.
- Bit 4: Not used.
- Bit 5: Not used.
- Bit 6: Not used.
- Bit 7: Not used.

V07 (address: 5007):
Status of the operating modes (reading/writing variable).

								LSB
Operation modes	7	6	5	4	3	2	1	0

- Bit 0: 1 = Exit the setting mode after Reset to factory settings.
- Bit 1: 1 = It exits the setting mode after changing from Scalar to Vector control..
- Bit 2: 1 = Abort Self-tuning..
- Bit 3: Not used.
- Bit 4: Not used.
- Bit 5: Not used.
- Bit 6: Not used.
- Bit 7: Not used.

V08 (address: 5008):
Motor speed in 13 bits (reading variable).

V09 (address: 5009). Reading:

- Bit 0: 1 = Inverting DOR (Direction of Rotation).
- Bit 1: 1 = Alarm active.

VB 12 (address: 5012). Digital Output State:

It allows changing the state of the Digital Outputs set to Serial in parameters P0275...P0280.

The word that defines the state of the digital outputs is formed by 16 bits, with the following construction:

Upper bits: define the output you want to control when set to 1.

- Bit 8: 1 - DO1 output control.
- Bit 9: 1 - DO2 output control.
- Bit 10: 1 - RL1 output control.
- Bit 11: 1 - RL2 output control.
- Bit 12: 1 - RL3 output control.
- Bit 13: 1 - RL4 output control.
- Bit 14: 1 - RL5 output control.

Lower bits: define the desired state for each output.

- Bit 0: - DO1 output state: 0 = output disabled, 1 = output enabled.
- Bit 1: - DO2 output state: 0 = output disabled, 1 = output enabled.
- Bit 2: - RL1 output state: 0 = output disabled, 1 = output enabled.
- Bit 3: - RL2 output state: 0 = output disabled, 1 = output enabled.
- Bit 4: - RL3 output state: 0 = output disabled, 1 = output enabled.
- Bit 5: - RL4 output state: 0 = output disabled, 1 = output enabled.
- Bit 6: - RL5 output state: 0 = output disabled, 1 = output enabled.

7.2.5 Modbus-RTU

The Modbus protocol was initially developed in 1979. Currently, it is an open protocol widely used by several manufacturers in different kinds of equipment. The Modbus-RTU communication of the MVW01 was developed based on two documents:

1. MODBUS Protocol Reference Guide Rev. J, MODICON, 1996.
2. MODBUS Application Protocol Specification, MODBUS.ORG, 2002.

These documents define the format of messages used by the elements that are part of the Modbus network, the services (or functions) that can be provided via network and how these elements exchange data on the network.

7.2.5.1 Transmission Modes

The protocol specification defines two transmission modes: ASCII and RTU. The modes define the way the message bytes are transmitted. It is not possible to use two transmission modes on the same network.

In the RTU mode, each word transmitted has 1 start bit, eight data bits, 1 parity bit (optional) and 1 stop bit (2 stop bits if no parity bit is used). Thus, the sequence of bits for transmission of a byte is as follows:

START	B0	B1	B2	B3	B4	B5	B6	B7	Parity or STOP	STOP

In the RTU mode, each data byte is transmitted as a single word with its value directly in hexadecimal. the MVW01 uses only this transmission mode for communication; therefore, it does not have communication in ASCII mode.

7.2.5.2 Message structure in the RTU Mode

The Modbus-RTU network operates in the Master-Slave system, which may contain up to 247 slaves, but only one master. Every communication begins with the master making a request to a slave, and the slave responds to the master what was requested. In both telegrams (request and response), the structure used is the same: Address, Function Code, Data and CRC. Only the data field can have variable length, depending on what is being requested.

Table 7.20: *Telegram structure*

Master	Slave
Slave address (1 byte)	Slave address (1 byte)
Function (1 byte)	Function (1 byte)
Data (n bytes)	Data (n bytes)
CRC (2 bytes)	CRC (2 bytes)

Address:
The master starts the communication by sending a byte with the address of the slave destination of the message.

When sending the response, the slave also starts the telegram with its own address. The master can also send a message to address 0 (zero), which means that the message is sent to all the slaves on the network (broadcast). In this case, no slave will respond to the master.

Function Code:
This field also contains a single byte, where the master specifies the type of service or function requested from the slave (reading, writing, etc.). According to the protocol, each function is used to access a specific type of data.

In MVW01, data related to parameters and basic variables are available as holding registers type (referenced from address 40000 or '4x'). In addition to those registers, the inverter status (enabled/disabled, with error/without error, etc.) and the command for the inverter (run/stop, forward run/reverse run, etc.) can also be accessed through functions for reading/writing "coils" or internal bits (referenced from address 00000 or '0x').

Data Field:
Field with variable size. The format and content of this field depend on the function used and the values transmitted. This field is described together with the functions (see Section 7.2.7 Detailed description of the functions on page 7-42).

CRC:
The last part of the telegram is the field for checking transmission errors. The method used is the CRC-16 (Cycling Redundancy Check). This field consists of two bytes, where the least significant byte (CRC-) is transmitted first, and then the most significant byte (CRC+).

The CRC calculation starts first by loading a 16-bit variable (from now on referred to as CRC variable) with the FFFFh value. Then perform the steps according to the following routine:

1. The first byte of the message (only the data bits - start bit, parity and stop bit are not used) is submitted to an XOR logic (exclusive OR) with the eight least significant bits of the CRC variable, returning the result in the CRC variable itself.

2. Then, the CRC variable is shifted one position to the right, towards the least significant bit, and the position of the most significant bit is filled in with 0 (zero).
3. After this shift, the flag bit (bit that was shifted out of the CRC variable) is analyzed, with the following occurring:
   - If the bit value is 0 (zero), nothing is done.
   - If the bit value is 1, the content of the CRC variable is submitted to an XOR logic with a constant value of A001h, and the result is returned to the CRC variable.
4. Steps 2 and 3 are repeated until eight shifts.
5. Steps 1 through 4 are repeated, using the next byte of the message, until the entire message has been processed.

The final content of the CRC variable is the value of the CRC field that is transmitted at the end of the telegram. The least significant part is transmitted first (CRC-) and then the most significant part (CRC+).

Time between Messages:
The RTU mode does not have a specific character that indicates the beginning or the end of a telegram. Thus, what indicates when a new message starts or when it finishes is the absence of data transmission on the network for a minimum period of 3.5 times the transmission time of a data word (11 bits). Thus, if a telegram is started after this minimum no transmission period has elapsed, the network elements will assume that the character received represents the beginning of a new telegram. And, likewise, the network elements will assume that the telegram reached the end after this period has elapsed again.

If during the transmission of a telegram, the time between the bytes is longer than this minimum period, the telegram will be considered invalid, because the inverter will discard the bytes already received and build a new telegram with the bytes that are being transmitted.

The table below shows the times for three different baud rates.

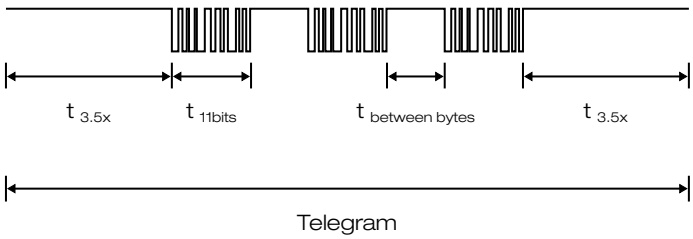


Figure 7.19: *Times involved during the communication of a telegram*

Table 7.21: *Telegram transmission time*

Baud rate [kbps]	$t_{11\ bits}$ [µs]	$t_{3.5x}$ [ms]
9600	1146	4.010
19200	573	2.005
38400	285	1.003

$t_{11\ bits}$ = time to transmit a word of the telegram.
time between bytes = time between bytes (cannot be longer than 3.5x time).
$t_{3.5x}$ = minimum interval to indicate the beginning and end of the telegram (3.5 times the 11-bit time).

7.2.6 Operation

The MVW01 frequency inverters operate as slaves to the Modbus-RTU network, and every communication starts with the master of the Modbus-RTU network requesting some service from an address on the network.

If the inverter is configured for the corresponding address, it processes the request and responds what was requested to the master.

Available Functions and Response Times:
In the specification of the Modbus-RTU protocol, you define the functions used to access the register types described in the specification. In MVW01, both parameters and basic variables were defined as holding registers (referred to as 4x). In addition to these registers, it is also possible to directly access internal command and monitoring bits (referred to as 0x). To access these bits and registers, the following services (or functions) were provided for MVW01 frequency inverters:

Read Coils
Description: Reading of block of internal bits or coils.
Function code: 01.
Broadcast: not supported.
Response time: 5 to 10 ms.

Read Holding Registers
Description: Reading of block of holding registers.
Function code: 03.
Broadcast: not supported.
Response time: 5 to 10 ms.

Write Single Coil
Description: Writing on a single internal bit or coil.
Function code: 05.
Broadcast: supported.
Response time: 5 to 10 ms.

Write Single Register
Description: Writing on a single holding register.
Function code: 06.
Broadcast: supported.
Response time: 5 to 10 ms.

Write Multiple Coils
Description: Writing on block of internal bits or coils.
Function code: 15.
Broadcast: supported.
Response time: 5 to 10 ms.

Write Multiple Registers
Description: Writing on block of holding registers.
Function code: 16.
Broadcast: supported.
Response time: 10 to 20 ms for each written register.

Read Device Identification
Description: Identification of the inverter model.
Function code: 43.
Broadcast: not supported.
Response time: 5 to 10 ms.

NOTE!

- Slaves on the Modbus-RTU network are addressed from 1 to 247.
- Address 0 (zero) is used by the master to send a common message to all slaves (broadcast).
- All registers (parameters and basic variables) are treated as holding registers, referenced from 40000 or '4x', while the bits are referenced from 0000 or 0x.

Data Addressing and Offset:
The data addressing in the MVW01 is done with an offset equal to zero, which means that the address number is equivalent to the given number. The parameters are available starting from address 0 (zero), while the basic variables are available starting from address 5000. Likewise, the status bits are provided starting from address 0 (zero) and the command bits are provided starting from address 100.

The following table illustrates the addressing of bits, parameters and basic variables:

Table 7.22: *Addressing of bits, parameters and basic variables*

Parameter	Modbus address
P0000	0
P0001	1
...	...
P0100	100
...	...

Basic variable	Modbus address
V00	5000
V01	5001
...	...
V08	5008

Status bits	Modbus address
Bit 0	00
Bit 1	01
...	...
Bit 7	07

Command bits	Modbus address
Bit 100	100
Bit 101	101
...	...
Bit 107	107

The status bits have the same functions as bits 8 to 15 of the logical status (basic variable 2). These bits are available as read only, and any writing command returns an error to the master.

Table 7.23: *Status bits*

Bit number	Function
0	0 = Enable by ramp inactive 1 = Enable by ramp active
1	0 = General enable inactive 1 = General enable active
2	0 = Reverse run 1 = Forward run
3	0 = JOG inactive 1 = JOG active
4	0 = Local mode 1 = Remote mode
5	0 = Without undervoltage 1 = With undervoltage
6	Not used
7	0 = Without fault 1 = With fault

The command bits are available for reading and writing and have the same function as bits 0 to 7 of the logical command (basic variable 3), without requiring mask though. The writing on basic variable 3 has an influence on the status of these bits.

Table 7.24: *Command bits*

Bit number	Function
100	0 = Disable ramp (Stop) 1 = Enables ramp (Run)
101	0 = General Disable 1 = General Enable
102	0 = Reverse run 1 = Forward run
103	0 = Disable JOG 1 = Enable JOG
104	0 = Go to Local mode 1 = Go to Remote mode
105	Not used
106	Not used
107	0 = Do not reset inverter 1 = Reset inverter

7.2.7 Detailed description of the functions

This item describes in details the functions available in the MVW01 for Modbus-RTU communication. For the preparation of telegrams, it is important to note the following:

- Values are always transmitted in hexadecimal.
- The address of a data, the number of data and the value of registers are always represented in 16 bits. Therefore, it is necessary to transmit those fields using two bytes (high and low). To access bits, the way to represent a bit depends on the function used.
- Telegrams for both request and response cannot exceed 128 bytes.

7.2.7.1 Function 01 - Read Coils

Reads the contents of a group of internal bits that must be in numerical sequence. This function has the following structure for the reading and response telegrams (the values are always hexadecimal, and each field represents a byte):

Table 7.25: *Telegram structure*

Request (Master)	Response (Slave)
Slave address	Slave address
Function	Function
Start bit address (byte high)	Number of data bytes
Start bit address (byte low)	Byte 1
Number of bits (byte high)	Byte 2
Number of bits (byte low)	Byte 3
CRC-	Byte n
CRC+	CRC-
-	CRC+

Each response bit is placed in a position of the data bytes sent by the slave. The first byte, in bits 0 to 7, receives the first 8 bits from the starting address indicated by the master. The other bytes (if the number of reading bits is greater than 8), continue the sequence. If the number of bits read is not a multiple of 8, the remaining bits of the last byte must be filled in with 0 (zero).

Example: reading of the status bits for general enable (bit 1) and direction of rotation (bit 2) of the of the MVW01 at address 1:

Table 7.26: *Telegram structure example*

Request from the master	
Field	**Value**
Address	0x01
Function	0x01
Starting bit (high)	0x00
Starting bit (low)	0x01
Number of bits (high)	0x00
Number of bits (low)	0x02
CRC-	0xEC
CRC+	0x0B

Slave response	
Field	**Value**
Address	0x01
Function	0x01
Byte Count	0x01
Status of bits 1 and 2	0x02
CRC-	0xD0
CRC+	0x49

In the example, since the number of bits read is less than 8, the slave needed only 1 byte for the response. The value of the byte was 02h, which in binary has the form 0000 0010. Since the number of bits read is equal to 2, we are only interested in the two least significant bits, which have the values 0 = general disabled and 1 = forward run. As the remaining bits were not requested, they are filled with 0 (zero).

7.2.7.2 Function 03 - Read Holding Register

Reads the contents of a group of registers that must be in numerical sequence. This function has the following structure for the reading and response telegrams (the values are always hexadecimal, and each field represents a byte):

Table 7.27: *Telegram structure*

Request (Master)	Response (Slave)
Slave address	Slave address
Function	Function
Starting register address (byte high)	Number of data bytes
Starting register address (byte low)	Data 1 (High)
Number of registers (byte high)	Data 1 (Low)
Number of registers (byte low)	Data 2 (High)
CRC-	Data 2 (Low)
CRC+	Data n (High)
-	Data n (Low)
-	CRC+
-	CRC+

Example: reading of the values with proportional value to Motor Speed (P0002) and Motor Current (P0003) of the MVW01 at address 1:

Table 7.28: *Telegram structure example*

Request from the master	
Field	**Value**
Address	0x01
Function	0x03
Starting register (high)	0x00
Starting register (low)	0x02
Number of registers (high)	0x00
Number of registers (low)	0x02
CRC-	0x65
CRC+	0xCB

Slave response	
Field	**Value**
Address	0x01
Function	0x03
Byte Count	0x04
P0002 (high)	0x03
P0002 (low)	0x84
P0003 (high)	0x00
P0003 (low)	0x35
CRC-	0x7A
CRC+	0x49

Each register always consists of two bytes (high and low). For the example, we have that P0002 = 0384h, which in decimal is equal to 900. As this parameter has no decimal place for indication, the actual value read is 900 rpm.

Likewise, we have the current value P0003 = 0035h, which is equal to 53 decimal. As the current has a resolution of one decimal place, the actual value read is 5.3 A.

7.2.7.3 Function 05 - Write Single Coil

This function is used to write a value for a single bit. The value for the bit is represented using two bytes, where the value FF00h represents the bit equal to 1, and the value 0000h represents the bit equal to 0 (zero). It has the following structure (values are always hexadecimal, and each field represents one byte):

Table 7.29: *Telegram structure*

Request (Master)	Response (Slave)
Slave address	Slave address
Function	Function
Bit address (byte high)	Bit address (byte high)
Bit address (byte low)	Bit address (byte low)
Bit value (byte high)	Bit value (bye high)
Bit value (byte low)	Bit value (bye low)
CRC-	CRC-
CRC+	CRC+

Example: activating the command enables ramp (bit 100 = 1) of a MVW01 at address 1:

Table 7.30: *Telegram structure example*

Request from the master	
Field	**Value**
Address	0x01
Function	0x05
Bit number (high)	0x00
Bit number (low)	0x64
Bit value (high)	0xFF
Bit value (low)	0x00
CRC-	0xCD
CRC+	0xE5

Slave response	
Field	**Value**
Address	0x01
Function	0x01
Bit number (high)	0x01
Bit number (low)	0x02
Bit value (high)	0xD0
Bit value (high)	0x49
CRC-	0xCD
CRC+	0xE5

For this function, the slave response is an identical copy of the request made by the master.

7.2.7.4 Function 06 - Write Single Register

This function is used to write a value for a single register. It has the following structure (values are always hexadecimal, and each field represents one byte):

Table 7.31: *Telegram structure*

Request (Master)	Response (Slave)
Slave address	Slave address
Function	Function
Starting register address (byte high)	Register address (byte high)
Starting register address (byte low)	Register address (byte low)
Value for the register (byte high)	Value for the register (byte high)
Value for the register (byte low)	Value for the register (byte low)
CRC-	CRC-
CRC+	CRC+

Example: speed reference writing (basic variable 4) equal to 900 rpm, of an MVW01 at address 1.

It is worth of notice that the value for basic variable 4 depends on the type of motor used, and that value 8191 is equivalent to the rated motor speed. In this case, let us assume the motor has an 1800 rpm rated speed; so, the value that will be written in basic variable 4 for a 900 rpm speed is half 8191, that is, 4096 (1000h).

Table 7.32: *Telegram structure example*

Request from the master	
Field	**Value**
Address	0x01
Function	0x06
Register (high)	0x13
Register (low)	0x8C
Value (high)	0x10
Value (low)	0x00
CRC-	0x41
CRC+	0x65

Slave response	
Field	**Value**
Address	0x01
Function	0x06
Register (high)	0x13
Register (low)	0x8C
Value (high)	0x10
Value (low)	0x00
CRC-	0x41
CRC+	0x65

For this function, again, the slave response is an identical copy of the request made by the master.
As stated earlier, the basic variables are addressed from 5000, so the basic variable 4 is addressed at 5004 (138Ch).

7.2.7.5 Function 15 - Write Multiple Coils

This function allows you to write values for a group of bits, which must be in numerical sequence. It can also be used to write a single bit (values are always hexadecimal, and each field represents a byte).

Table 7.33: *Telegram structure*

Request (Master)	Response (Slave)
Slave address	Slave address
Function	Function
Start bit address (byte high)	Starting bit address (byte high)
Start bit address (byte low)	Starting bit address (byte low)
Number of bits (byte high)	Number of bits (byte high)
Number of bits (byte low)	Number of bits (byte low)
Byte Count	CRC-
Byte 1	CRC+
Byte 2	-
Byte n	-
CRC-	-
CRC+	-

The value of each bit being written is placed in a position of the data bytes sent by the master.

The first byte, in bits 0 to 7, receives the first 8 bits from the starting address indicated by the master.

The other bytes (if the number of written bits is greater than eight) continues the sequence. If the number of bits written is not a multiple of 8, the remaining bits of the last byte must be filled with 0 (zero).

Example: writing of the commands to enable ramp (bit 100 = 1), general enable (bit 101 = 1) and reverse run (bit 102 = 0), for a MVW01 at address 1:

Table 7.34: Telegram structure example

Request from the master	
Field	**Value**
Address	0x01
Function	0x0F
Starting bit (byte high)	0x00
Starting bit (byte low)	0x64
Number of bits (byte high)	0x00
Number of bits (byte low)	0x03
Byte Count	0x01
Value for the bits	0x03
CRC-	0xBE
CRC+	0x9E

Slave response	
Field	**Value**
Address	0x01
Function	0x0F
Starting bit (byte high)	0x00
Starting bit (byte low)	0x64
Number of bits (byte high)	0x00
Number of bits (byte low)	0x03
CRC-	0x54
CRC+	0x15

As only three bits are being written, the master needed only one byte to transmit the data. The transmitted values are in the three least significant bits of the byte that contains the value for the bits. The remaining bits of this byte were left with value 0 (zero).

7.2.7.6 Function 16 - Write Multiple Registers

This function allows writing values for a group of registers, which must be in numerical sequence.
It can also be used to write a single register (values are always hexadecimal, and each field represents a byte).

Table 7.35: Telegram structure

Request (Master)	Response (Slave)
Slave address	Slave address
Function	Function
Starting register address (byte high)	Starting register address (byte high)
Starting register address (byte low)	Starting register address (byte low)
Number of registers (byte high)	Number of registers (byte high)
Number of registers (byte low)	Number of registers (byte low)
Byte Count	CRC-
Data 1 (high)	CRC+
Data 1 (low)	-
Data 2 (high)	-
Data 2 (low)	-
Byte n (high)	-
Byte n (low)	-
CRC-	-
CRC+	-

Example: writing of Acceleration time (P0100) = 1.0 if Deceleration time (P0101) = 2.0 s, of a MVW01 at address 20:

Table 7.36: Telegram structure example

Request from the master	
Field	**Value**
Address	0x14
Function	0x10
Starting register (byte high)	0x00
Starting register (byte low)	0x64
Number of registers (byte high)	0x00
Number of registers (byte low)	0x02
Byte Count	0x04
P0100 (high)	0x00
P0100 (low)	0x0A
P0100 (high)	0x00
P0100 (low)	0x14
CRC-	0x91
CRC+	0x75

Slave response	
Field	**Value**
Address	0x14
Function	0x10
Starting register (high)	0x00
Starting register (low)	0x64
Number of registers (high)	0x00
Number of registers (low)	0x02
CRC-	0x02
CRC+	0xD2

As both parameters have a resolution of one decimal place, for writing 1.0 and 2.0 seconds, the values 10 (000Ah) and 20 (0014h) must be transmitted, respectively.

7.2.7.7 Function 43 - Read Device Identification

Auxiliary function that allows reading the product manufacturer, model and firmware version. It has the following structure:

Table 7.37: Telegram structure

Request (Master)	Response (Slave)
Slave address	Slave address
Function	Function
MEI type	MEI type
Reading code	Conformity Level
Object number	More Follows
CRC-	Next Object
CRC+	Number of objects
-	Object Code
-	Object Size
-	Object Value
-	CRC-
-	CRC+

Fields are repeated according to the number of objects.
This function allows reading three categories of information: Basic, Regular and Extended, and each category is formed by a group of objects. Each object consists of a sequence of ASCII characters. For the MVW01, only basic information is available, consisting of three objects:

- Object 00 - VendorName: 'WEG'.
- Object 01 - ProductCode: Formed by the product code plus the inverter rated current.
- Object 02 - MajorMinorRevision: indicates the inverter firmware version, in the 'VX.XX' format.

The reading code indicates which information categories are being read and whether the objects are being accessed in sequence or individually. In this case, the inverter supports codes 01 (basic information in sequence) and 04 (individual access to objects).

The remaining fields for the MVW01 have fixed values.

Example: reading of basic information in sequence, from object 00, of a MVW01 at address 1:

Table 7.38: *Telegram structure example*

Request from the master	
Field	**Value**
Address	0x01
Function	0x2B
MEI type	0x0E
Reading code	0x01
Object number	0x00
CRC-	0x70
CRC+	0x77

Slave response	
Field	**Value**
Address	0x01
Function	0x2B
MEI type	0x0E
Reading code	0x01
Conformity Level	0x51
More Follows	0x00
Next Object	0x00
Number of objects	0x03
Object Code	0x00
Object Size	0x03
Object Value	'WEG'
Object Code	0x01
Object Size	0x0E
Object Value	'MVW01 7.0A'
Object Code	0x02
Object Size	0x05
Object Value	'V2.09'
CRC-	0xB8
CRC+	0x39

In this example, the value of the objects was not represented in hexadecimal but using the corresponding ASCII characters. For example, for object 00, the value 'WEG' was transmitted as three ASCII characters, which in hexadecimal have the values 57h (W), 45h (E) and 47h (G).

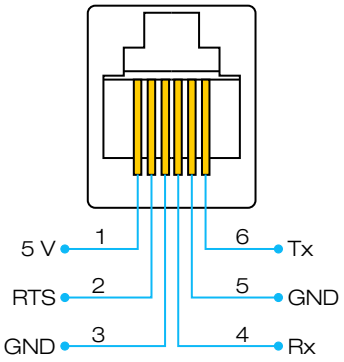
7.3 PLC2 BOARD

The PLC2 board adds to the MVW01 inverter important PLC functions (Programmable Logic Controller), enabling the execution of Ladder programs. It also offers CANopen, DeviceNet and Modbus-RTU communication, in addition to increasing the number of I/Os of Fieldbus communications with Anybus-S board.

NOTE!
The PLC2 board has its own manual, which can be consulted for detailed information.

7.3.1 Modbus-RTU

7.3.1.1 Connector



Pin	Signal	Function
1	+5V	Power supply
2	RTS	Ready to send
3	GND	Power supply reference
4	Rx	RS-232, data reception
5	GND	Power supply reference
6	Tx	RS-232, data transmission

Figure 7.20: *XC7 connector: Modbus-RTU*

7.3.1.2 Parameter setting

P0764 - PLC address

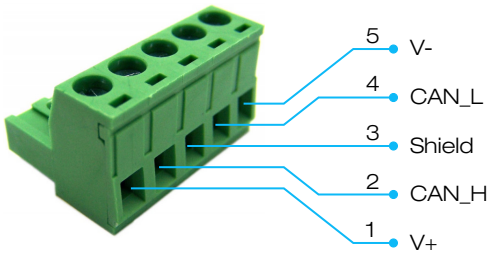
Defines the serial address of the PLC2 board.

P0765 - RS232 baud rate

Defines the serial communication baud rate.

7.3.2 CANopen

7.3.2.1 Connector



Pin	Signal	Function
1	V-	Power supply reference
2	CAN_L	CAN_L
3	Shield	Cable shield
4	CAN_H	CAN_H
5	V+	Power supply: 11...25Vcc

Figure 7.21: *XC17 connector: CANopen*

7.3.2.2 Termination

The starting and ending points of the network must be terminated at the characteristic impedance to avoid reflections. To that end, a 120 Ohms/0.5 W resistor must be connected between pins 2 and 4 of the connector.

7.3.2.3 Inverter parameter setting

P0770 - CAN protocol

It allows selecting which protocol is desired for communication through the CAN interface.

7.3.2.4 Node address

P0771 - CAN address

It allows selecting the PLC2 address on the CAN network; the node address can be set from 1 to 127.

7.3.2.5 Baud rate

P0772 - CAN baud rate

It sets the CAN baud rate.

Table 7.39: *Baud rates of the CANopen network*

P0772	Description
0	1 Mbps
1	Reserved
2	500 kbps
3	250 kbps
4	125 kbps
5	100 kbps
6	50 kbps
7	20 kbps
8	10 kbps

7.3.3 DeviceNet

7.3.3.1 Inverter parameter setting

P0770 - CAN protocol

It allows selecting which protocol is desired for communication through the CAN interface.

7.3.3.2 Node address

P0771 - CAN address

It allows selecting the PLC2 address on the CAN network; the node address can be set from 0 to 63.

7.3.3.3 Baud rate

P0772 - CAN baud rate

It sets the CAN baud rate.

Table 7.40: Baud rates of the DeviceNet network

P0772	Description
0	auto-baud
1	auto-baud
2	500 kbps
3	250 kbps
4	125 kbps
5	auto-baud
6	auto-baud
7	auto-baud
8	auto-baud

7.3.4 Fieldbus

It allows the user to define more than six input and output variables that will be used by the Fieldbus network.

The following items are the same as described for Fieldbus networks without a PLC2 board:

- Connector
- Termination resistor
- Baud rate
- LED indicators

See Chapter 7.1 FIELDBUS on page 7-1 for more information.

7.3.4.1 Inverter parameter setting

There is a set of parameters that enable and configure the operation of the inverter in the Fieldbus network with PLC2 board. Before starting the network operation, it is necessary to configure these parameters so that the inverter operates as desired.

P0774 - Communication failure

Selects between alarm indication or fault occurrence, if the inverter is being controlled by the network and a communication failure occurs.

P0275 - DO1 Function
P0276 - DO2 Function
P0277 - RL1 Function
P0279 - RL2 Function
P0280 - RL3 Function
P0281 - RL4 Function
P0282 - RL5 Function

These parameters define the function of the inverter digital outputs. For the digital outputs to be operated via Fieldbus with a PLC2 board, it is necessary to program these parameters for the “PLC” option.

LOCAL setting:

P0220 - LOCAL/REMOTE selection source
P0221 - Speed reference selection LOCAL situation
P0223 - Forward/Reverse Selection LOCAL Situation

P0224 - Start/Stop Selection LOCAL Situation
P0225 - Selection of JOG Source LOCAL Situation

REMOTE setting:

P0220 - LOCAL/REMOTE selection source
P0222 - Speed reference selection REMOTE situation
P0226 - Selection of Direction of ROTATION REMOTE Situation
P0227 - Start/Stop Selection REMOTE Situation
P0228 - JOG Selection - REMOTE Situation

These parameters define the source of commands and references for the inverter in the LOCAL and REMOTE modes.
For the commands to be operated via Fieldbus with a PLC2 board, it is necessary to program these parameters for the “PLC” option.

7.3.4.2 Read/written variables

The following data can be configured in the WLP software, via Menu → Tools → Anybus:

Inputs: allows to program the data sent from the PLC2 board to the network master.
Outputs: allows to program the data sent by the network master and received by the PLC2 board.

In the list of inputs and outputs, different data can be added:

- User parameters
- Word Markers
- Bit markers (always multiples of 16, because for each line added with bit markers, groups of 16 markers are considered to form a word).

Each data added to this list is 1 word (16 bits) long. The order in which the data is programmed in these lists is the same order in which this data is received and sent by the master of the network.
The maximum number of words that can be configured increases from 6 to 32.

NOTE! For use of the PLC2 board and anybus board, the parameter P0309 must be set to “inactive” so that the quantity of anybus IO’s configured on the PLC2 works correctly.

7.3.4.3 Application example

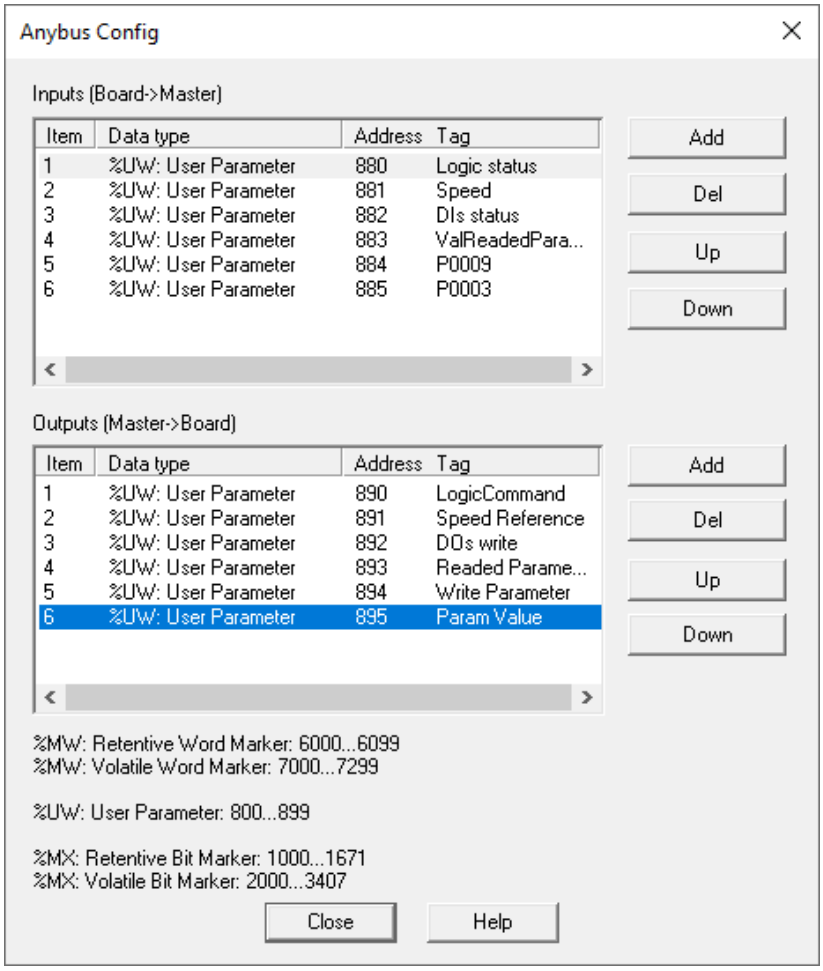


Figure 7.22: *Anybus-S word mapping*

8 DIAGNOSTICS AND TROUBLESHOOTING

This chapter assists the user in the identification and correction of possible faults that may occur during the inverter operation. Guidance on the necessary periodical inspections and cleaning of the inverter is also provided.

8.1 ALARMS, FAULTS AND POSSIBLE CAUSES

When faults or alarms are detected, the inverter indicates them on the HMI. Alarms and faults are displayed as AXXX (for alarms) and FXXX (for faults), and "XXX" is the code of the alarm or fault.

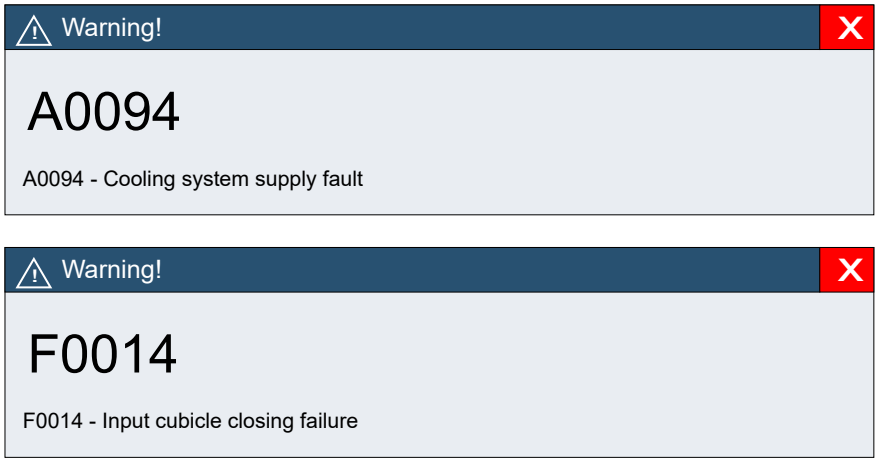


Figure 8.1: *Example of alarm and fault codes displayed on the HMI*

If a fault occurs the inverter is disabled, whereas in an alarm event it continues operating normally. In order to restart the inverter after a fault has occurred, it must be reset. The reset can normally be performed in the following manners:

- By pressing the key (Manual Reset).
- Automatically through P0206 (Auto-reset).
- Via digital input: DI3 (P0265 = 12) or DI4 (P0266 = 12) or DI5 (P0267 = 12) or DI6 (P0268 = 12) or DI7 (P0269 = 12) or DI8 (P0270 = 12) or DI9 (P0271 = 12) or DI10 (P0272 = 12): DI Reset.
- Via networks.

The table below defines each alarm/fault code, explains how to reset the faults and shows the possible causes for each one.

Fault/alarm	Reset	Possible causes
A0001 Mains Low Voltage	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • DIx. • Networks.	• The input transformer secondary voltage is less than 80 % of the rated value. • Undervoltage on the supply line. • Incorrect settings of the input transformer primary taps.
A0002 Mains High Voltage	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • DIx. • Networks.	• The input transformer secondary voltage is greater than 114 % of the rated value. • Power supply overvoltage. • Incorrect settings of the input transformer primary taps.

Fault/alarm	Reset	Possible causes
F0003 Under Voltage / Phase Loss	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• The input transformer secondary voltage is less than 70 % of the rated value. • Power supply undervoltage. • Incorrect settings of the input transformer primary taps. • See P0673 (Transformer second. undervoltage level).
F0004 Mains Over Voltage	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• The input transformer secondary voltage is greater than 117 % of the rated value. • Power supply overvoltage. • Incorrect settings of the input transformer primary taps.
F0006 Mains unbalance/ loss of phase	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Phase loss at the power supply. • Voltage imbalance greater than 10 % of the rated value.
F0007 Mains voltage feedback fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.
A0008 Line Sync. Time Out	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Synchronism function could not synchronize successfully.
A0010 Rectifier high temperature alarm	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Temperature higher than 75 °C (167 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fan. • Obstructed air inlet filter.
F0011 Rectifier Over Temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx.	• Temperature higher than 95 °C (203 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0012 Rectifier feedback temperature	• Power-on. • Contact WEG Service Center.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.
F0013 Sin. Filter CB Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the closing or opening of the output contactor. • Defect on the DI/DO connections of the sinusoidal filter drive and feedback function.
F0014 Circuit Breaker Closing Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Input circuit breaker will not close when commanded. • Defective circuit breaker. • Wiring of the DI3 input of PIC board (XC7:3) open (no feedback of +24 V) in the closing of the cubicle.

Fault/alarm	Reset	Possible causes
F0015 Circuit Breaker Opening Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Input cubicle will not open when commanded. • Defective circuit breaker. • Wiring of DI4 input of PIC board (XC7:4) open (no feedback 24 V) in the opening of the cubicle.
F0016 External Trip CB Protection	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Trip of the input cubicle protection related to the inverter main transformer. • Wiring on DI5 input of PIC board (XC7:5) open (no feedback of +24 V).
F0017 Circuit Breaker not Ready	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Input circuit breaker not ready when commanded to close. • Defective circuit breaker. • Attempt to turn on the circuit breaker via DI1, while the inverter is indicating via DO1, which is not able to close the circuit breaker.
A0018 Input Transform. Alarm	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Inverter main transformer alarm. • Wiring of DI11 of PIC board (XC7:16) open (no feedback +24 V).
F0019 Input Transform. Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Inverter main transformer fault. • Wiring of DI12 input of PIC board (XC8:1) open (no feedback +24 V).
F0020 Pre-Charge Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• DC link voltages have not risen to the necessary level to complete the pre-charge process within the established time. • Wrong setting of the auxiliary transformer secondary tap. • Low voltage or phase loss in the auxiliary power supply. • Fault on contactors of pre-charging circuit. • Defective pre-charge system capacitor.
F0021 DC Link Under Voltage	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Input cubicle was commanded to open, through the opening of DI1 of PIC board, with the inverter enabled.
F0022 DC Link Over Voltage	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• The power supply voltage is too high producing a DC link voltage higher than the maximum (130 % of the nominal value). • The load inertia is too high or the deceleration ramp is too fast. • P0151 or P0153 setting is too high.
F0023 DC Link Unbalance	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• The difference between the positive and the negative DC link voltages >15 % of the rated value.
F0024 DC Link Voltage Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.

Fault/alarm	Reset	Possible causes
F0025 Closing Doors Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Attempt to energize the inverter with the panel doors unlocked. • Unlocking of the doors with the inverter enabled or with the DC links energized. • Wiring at DI16 input of PIC board (XC8:10) open (no feedback of +24 V with the doors closed).
F0026 Circuit Breaker not Ready	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Input cubicle indicating, via DI2, it is not available for operation. • Defective input cubicle. • Wiring of DI2 input of PIC board (XC7:2) open (no feedback of +24 V).
F0027 Improper opening of the input CB	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Input cubicle opening command with inverter enabled. • Wiring of DI1 input of PIC board (XC7:1) open (no feedback of +24 V).
F0030 IGBT1 ph U Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0031 IGBT2 ph U Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0032 IGBT3 ph U Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0033 IGBT4 ph U Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0034 IGBT1 ph V Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0035 IGBT2 ph V Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0036 IGBT3 ph V Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0037 IGBT4 ph V Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.

Fault/alarm	Reset	Possible causes
F0038 IGBT1 ph W Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0039 IGBT2 ph W Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0040 IGBT3 ph W Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0041 IGBT4 ph W Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0042 Breaking IGBT 1 Fault or SC	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Related to the gate driver fault feedback, its power supply or the IGBT desaturation. • Fiber optic cable not connected, inverted or defective.
F0043 Breaking IGBT 4 Fault or SC	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Related to the gate driver fault feedback, its power supply or the IGBT desaturation. • Fiber optic cable not connected, inverted or defective.
F0044 Arc Detection	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Electrical arcing detection by the panel sensors.
F0045 Electronic PS1 Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Problem with the PS1 power supply. • Fiber optic cable not connected, inverted or defective.
A0046 I x t Alarm	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Setting of P0156, P0157 and P0158 too low for the used motor. • Setting of P0159 too low for the used motor. • Load on the motor shaft too high. • Setting of P0136 and P0137 too high (valid for operation at low speed).
F0047 IGBT Overload Failure	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• A high current transitory occurred while the heatsink was with high temperature. • Actuation of the fault at 120 °C (248 °F).

Fault/alarm	Reset	Possible causes
F0048 Air Cooling Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fans blocked. • Input air filters blocked.
A0050 Phase U heatsink high temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Temperature higher than 75 °C (167 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fan. • Obstructed air inlet filter.
F0051 Phase U heatsink overtemperature	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Temperature higher than 80 °C (176 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0052 Phase U Heatsink Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.
A0053 Phase V heatsink high temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Temperature higher than 75 °C (167 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fan. • Obstructed air inlet filter.
F0054 Phase V heatsink overtemperature	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Temperature higher than 80 °C (176 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0055 Phase V Heatsink Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.
A0056 Phase W heatsink high temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Temperature higher than 75 °C (167 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fan. • Obstructed air inlet filter.
F0057 Phase W heatsink over temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Temperature higher than 80 °C (176 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0058 Phase W Heatsink Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.

Fault/alarm	Reset	Possible causes
A0059 PhaseBR heatsink high temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • DIx. • Networks.	• Temperature higher than 75 °C (167 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fan. • Obstructed air inlet filter.
F0060 PhaseBR heatsink over temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Temperature higher than 80 °C (176 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0061 PhaseBR Heatsink Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.
F0062 Therm. Unbalance Phases U - V - W	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Temperature difference among the phase heatsinks greater than 10 °C (50 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0063 Output Voltage U Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• For WEG use.
F0064 Output Voltage V Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• For WEG use.
F0065 Output Voltage W Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• For WEG use.
F0066 Null Current	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• For WEG use.
F0067 Encoder or Motor Miswired	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• For WEG use.
F0068 Test Mode Failure	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• For WEG use.

Fault/alarm	Reset	Possible causes
F0069 Calibration Error	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• For WEG use.
F0070 Overcurrent at output	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Inverter output instant current higher than twice the rated current (detection by Hardware). • Short circuit between two motor phases or power cables (detection by hardware). • Load inertia too high or acceleration ramp too fast. • Incorrect regulation and/or configuration parameter(s). • Setting of P0169, P0170 or P0171 too high.
F0071 Output Over Sw Current	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Short circuit between two motor phases or power cables (detection by hardware). • Load inertia too high or acceleration ramp too fast. • Incorrect regulation and/or configuration parameter(s). • Setting of P0169, P0170 or P0171 too high.
F0072 Output Over Load Ixt Function	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Setting of P0156, P0157 and P0158 too low for the used motor. • Setting of P0136 and P0137 too high (valid for operation at load speed). • Load on the motor shaft too high. • The output overload fault does not cause the opening of the input cubicle.
A0073 Ground Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Short-circuit to the ground in some point detected by software through the measurement of the feedback signal by fiber optic of the voltage Medium Point (MP) to the ground >25 %, the sum of the output currents is greater than 10 % of the rated current or current measurement CT defective.
F0074 Ground Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Time limit for operation with ground fault has elapsed. • The sum of the output currents is greater than 10 % of the rated current. • Current measurement CT defective.
F0075 Failure feedback of voltage between the Medium Point DC Link and ground	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.
F0076 Motor Unbalanced Current	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Motor cable disconnected or poor contact. • Fault on the current feedback circuit. • Difference between output currents above 12.5 % of the rated current for a period above the limit.
F0077 Breaking Resist. Overload	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• The load inertia is too high or the deceleration ramp is too fast. • Too heavy load at the motor shaft. • P0154 and P0155 programmed incorrectly.

Fault/alarm	Reset	Possible causes
F0078 Motor Over Temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Motor temperature above the fault level set on the thermal protection relay. • Digital input signal, coming from the thermal protection relay, set to "Fault on the motor" at low level.
F0079 Encoder Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Wiring between the motor speed sensor and the inverter interface board defective. • Speed sensor defective. • Cable length longer than the specified limit. • Speed sensor incorrectly installed on the motor.
F0080 CPU Watchdog Error	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Electric noise on the control boards.
F0083 Inverter Setup Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Attempt to set a parameter incompatible with the others. • See Table Table 4.3 on page 4-11 .
A0084 Auto-Diagnosis Alarm	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • DIx. • Networks.	• Incorrect programming of inverter model. • Incompatibility between the inverter current (P0295) and voltage (P0296) parameters; see values in the product manual.
F0085 Electronic Power Supply Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Power supply monitoring signal keeps indicating electronics power supplies not OK.
F0087 Link MVC3 - MVC4 Failure	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Fault on the serial communication circuit of the MVC3 board. • Fault on the serial communication circuit of the MVC4 board. • Fiber optic cables not connected or defective.
F0090 External Fault DIx is Open	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Digital input set to "No external fault" open (no feedback of +24 V). • For further details on this DI function, refer to the inverter project.
F0092 Pre-charge supply fault	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Short-circuit on the pre-charge system. • Pre-charge capacitors defective. • Pre-charge resistors defective. • Pre-charge circuit breaker open. • Wiring of DI7 input of PIC board (XC7:16) open (no feedback of +24 V).
A0093 Rectifier fan supply Fault - Set A	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • DIx. • Networks.	• Obstructed fans. • Obstructed air inlets filters. • Redundant ventilation set A failure alarm (MVC4).

Fault/alarm	Reset	Possible causes
A0094 Inverter cooling system failure - set A	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • DIx. • Networks.	• Short circuit in the ventilation system. • Fan locked. • Circuit breakers that feed the inverter ventilation system open. • Wiring of DI10 input of PIC board (XC7:15) open (no feedback of +24 V).
F0095 PS1 Supply Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Deactivation of the digital input DI8 (XC7:13) of the PIC board. • Wiring related to this signal is open (X7:13).
A0096 4...20 mA Alarm	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • DIx. • Networks.	• Cable of one or more analog inputs set to signal 4 to 20 mA disconnected or broken. • Current received at analog input below 3 mA.
F0097 4...20 mA Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Disconnection or breaking of the cable with analog input signal.
F0099 Self Diagnosis Current OffSet	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Offset of the output current measurements out of the acceptable range. • Defect on the output current measurement circuit.
F0100 Fatal Error MVC3 Control Card	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Invalid CPU addressing.
F0101 Incomp. Software Version	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Firmware version of the MVC3 control board incompatible with the MVC4.
F0102 EPLD generic failure	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Invalid data informed by the EPLD/FPGA of the MVC3 control board.
F0103 CC1 RAM Failure	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Auto-diagnosis fault of the SRAM with battery.
F0104 CC1 A/D Failure	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• A/D auto-diagnosis fault.

Fault/alarm	Reset	Possible causes
F0105 CC1 EEPROM Failure	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Auto-diagnosis fault on the EEPROM.
F0106 Fatal Error MVC4 Control Card	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Invalid CPU addressing.
A0107 Feedback Alarm	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Indicative alarm for WEG use.
A0108 Inverter Not Initialized	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Waiting for the boot conclusion.
F0109 General Disable MVC3	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Wiring of DI13 input of PIC board (XC8:7) open (no feedback of +24 V). • For further details on this DI function, refer to the inverter project.
A0110 Motor over temperature alarm	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Motor temperature above the alarm level set on the thermal protection relay. • Digital input signal, coming from the thermal protection relay, set to ”Motor alarm” at low level.
A0111 Dlx External Alarm	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Digital input set to ”No external alarm” open (no feedback of +24 V). • For further details on this DI function, refer to the inverter project.
F0112 Motor Over Speed	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• High acceleration mechanical torque on the load. • Motor speed above the limit set. • If P0002 > P0132 * P0134.
A0113 Rectifier Fan B Supply Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Obstructed fans. • Obstructed air inlet filters. • Redundant ventilation set B failure alarm (MVC4).

Fault/alarm	Reset	Possible causes
A0114 Inverter Fan B Supply Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • DIx. • Networks.	• Short circuit on the ventilation system. • Fan locked. • Circuit breakers that feed the inverter ventilation set B are open. • Digital input signal set to "No alarm on Redundant Fan B" at low level.
F0115 Master-Slave Communic. Error	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Fiber optic not connected, inverted or defective
F0116 Slave Fail	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• One of the slaves in fault. • For further details, see the fault description on the HMI of the slave racks.
F0117 Slave Current Unbalance	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Defect in the current measurement of the slaves. • Defect in the connections of the slaves to the motor. • Voltage difference on the DC links of the slave inverters. See the taps of the transformers. • Parameterization error.
F0119 Timeout communic thermal relay	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• P0315 > 0 and the cable for communication with the thermal protection relay disconnected or defective for more than 10 s. • Incorrect protection relay communication parameters or relay in **PRG** (programming) or **VIS** (programming view) modes.
A0120 Fault in the temperature sensor of the thermal protection relay	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • DIx. • Networks.	• Temperature sensor broken wire. • PT100 accessory connectors disconnected. • Temperature channel active without a sensor connected to the PT100 accessory.
F0121 Overtemperature detected by the thermal protection relay	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Temperature above the fault level set on the thermal protection relay and P0315 > 0.
A0122 Overtemperature detected by the thermal protection relay	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • DIx. • Networks.	• Temperature above the alarm level set on the thermal protection relay and P0315 > 0.
A0123 Inverter Setup Alarm	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • DIx. • Networks.	• Alarm occurs when parameter P0169 is set to a value beyond the one accepted by the overload duty. • P0169 above 15 % of the value of P0295 (Inverter rated current).

Fault/alarm	Reset	Possible causes
A0124 Param. Change w/ Inv. Enabled	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Specific Fieldbus/Serial fault.
A0125 Read/Write in Inexistent Para.	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Specific Fieldbus/Serial fault.
A0126 Parameter Value Out of Range	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Specific Fieldbus/Serial fault.
A0127 Function not Cfg.for Fieldbus	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Specific Fieldbus/Serial fault.
F0128 Fieldbus Connec. Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Specific Fieldbus/Serial fault.
A0129 Fieldbus Connec. Inactive	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Specific Fieldbus/Serial fault.
A0130 Inactive Fieldbus board	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Specific Fieldbus/Serial fault.
A0131 Rectifier high temperature alarm 1p	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Temperature higher than 75 °C (167 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fan. • Obstructed air inlet filter.
F0132 Rectifier Over Temperature 1p	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• The input rectifier temperature is higher than 95 °C (203 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fan. • Obstructed air inlet filter.

Fault/alarm	Reset	Possible causes
F0133 Rectifier feedback temperature 1p	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.
F0134 IGBT UAp 1 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0135 IGBT UAp 2 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0136 IGBT UAp 3 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0137 IGBT UAp 4 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0138 IGBT VAp 1 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0139 IGBT VAp 2 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0140 IGBT VAp 3 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0141 IGBT VAp 4 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0142 IGBT WAp 1 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0143 IGBT WAp 2 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.

Fault/alarm	Reset	Possible causes
F0144 IGBT WAp 3 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0145 IGBT WAp 4 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0146 Breaking IGBT 1B Fault or SC	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Related to the gate driver fault feedback, its power supply or the IGBT desaturation. • Fiber optic cable not connected, inverted or defective.
F0147 Breaking IGBT 2B Fault or SC	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Related to the gate driver fault feedback, its power supply or the IGBT desaturation. • Fiber optic cable not connected, inverted or defective.
F0148 PS1 2 power supply fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Problem with the PS1 power supply. • Fiber optic cable not connected, inverted or defective.
A0149 Phase UAp Heatsink high temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Temperature higher than 75 °C (167 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fan. • Obstructed air inlet filter.
F0150 Phase UAp Heatsink over temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Temperature higher than 80 °C (176 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0151 Phase UAp Heats. Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.
A0152 Phase VAp Heatsink high temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Temperature higher than 75 °C (167 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fan. • Obstructed air inlet filter.
F0153 Phase VAp Heatsink over temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Temperature higher than 80 °C (176 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.

Fault/alarm	Reset	Possible causes
F0154 Phase VAp Heats. Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.
A0155 Phase WAp Heatsink high temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Temperature higher than 75 °C (167 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fan. • Obstructed air inlet filter.
F0156 Phase WAp Heatsink over temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Temperature higher than 80 °C (176 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0157 Phase WAp Heats. Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.
A0158 PhaseBRBheatsink high temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Temperature higher than 75 °C (167 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fan. • Obstructed air inlet filter.
F0159 PhaseBRBheatsink over temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Temperature higher than 80 °C (176 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0160 PhaseBRBHeatsink Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.
F0161 Therm. Unbalance Phases Ap	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.
F0162 Output Volt. UAp Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• For WEG use.
F0163 Output Volt. VAp Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• For WEG use.

Fault/alarm	Reset	Possible causes
F0164 Output Volt. WAp Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• For WEG use.
A0165 Safety Stop is Active	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Activation of the safety stop function by the customer.
F0166 Therm. Unbalance Phases B	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Temperature difference among the phase heatsinks greater than 10 °C (50 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0167 Therm. Unbalance Phases Bp	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Temperature difference among the phase heatsinks greater than 10 °C (50 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0168 Therm. Unbalance Rect 123	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Temperature difference between the heatsinks of the rectifiers 1, 2 and 3 or 1p, 2p and 3p above. • Temperature above 40 ºC (104 °F) and high output current. • Defective or blocked fan. • Obstructed air inlet filters.
F0169 Therm. Unbalance Rect 123p	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Temperature difference between the heatsinks of the rectifiers 1, 2 and 3 or 1p, 2p and 3p above. • Temperature above 40 ºC (104 °F) and high output current. • Defective or blocked fan. • Obstructed air inlet filters.
A0170 Rectifier 2 high temperature alarm	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Heatsink temperature is higher than 75 °C (167 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0171 Rectifier 2 Over Temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Temperature higher than 95 °C (203 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0172 Rectifier 2 feedback temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.

Fault/alarm	Reset	Possible causes
A0173 Rectifier 3 high temperature alarm	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Heatsink temperature is higher than 75 °C (167 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0174 Rectifier 3 Over Temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Temperature higher than 95 °C (203 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0175 Rectifier 3 feedback temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.
F0176 IGBT UB 1 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0177 IGBT UB 2 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0178 IGBT UB 3 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0179 IGBT UB 4 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0180 IGBT VB 1 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0181 IGBT VB 2 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0182 IGBT VB 3 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.

Fault/alarm	Reset	Possible causes
F0183 IGBT VB 4 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0184 IGBT WB 1 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0185 IGBT WB 2 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0186 IGBT WB 3 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0187 IGBT WB 4 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0188 Electronic PS1 3 Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Problem with the PS1 power supply. • Fiber optic cable not connected, inverted or defective.
A0189 PhaseUB heatsink high temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Heatsink temperature is higher than 75 °C (167 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0190 PhaseUB heatsink over temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Temperature higher than 80 °C (176 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0191 PhaseUB Heatsink Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.
A0192 PhaseVB heatsink high temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Temperature higher than 75 °C (167 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fan. • Obstructed air inlet filter.

Fault/alarm	Reset	Possible causes
F0193 PhaseVB heatsink over temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Temperature higher than 80 °C (176 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0194 PhaseVB Heatsink Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.
A0195 PhaseWB heatsink high temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • Dlx. • Networks.	• Temperature higher than 75 °C (167 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fan. • Obstructed air inlet filter.
F0196 PhaseWB heatsink over temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Temperature higher than 80 °C (176 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0197 PhaseWB Heatsink Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.
F0198 Output Volt. UB Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• For WEG use.
F0199 Output Volt. VB Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• For WEG use.
F0200 Output Volt. WB Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• For WEG use.
F0210 IGBT UBp 1 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0211 IGBT UBp 2 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.

Fault/alarm	Reset	Possible causes
F0212 IGBT UBp 3 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0213 IGBT UBp 4 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0214 IGBT VBp 1 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0215 IGBT VBp 2 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0216 IGBT VBp 3 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0217 IGBT VBp 4 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0218 IGBT WBp 1 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0219 IGBT WBp 2 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0220 IGBT WBp 3 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0221 IGBT WBp 4 Fault or Short Circuit	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Fault on the fault feedback or gate-driver supply. • IGBT out of the saturation zone. • Fiber optic cable not connected, inverted or defective.
F0222 Electronic PS1 4 Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Problem with the PS1 power supply. • Fiber optic cable not connected, inverted or defective.

Fault/alarm	Reset	Possible causes
A0223 Phase UBp Heatsink high temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • DIx. • Networks.	• Temperature higher than 75 °C (167 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fan. • Obstructed air inlet filter.
F0224 Phase UBp Heatsink over temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Temperature higher than 80 °C (176 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0225 Phase UBp Heats. Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.
A0226 Phase VBp Heatsink high temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • DIx. • Networks.	• Temperature higher than 75 °C (167 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fan. • Obstructed air inlet filter.
F0227 Phase VBp Heatsink over temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Temperature higher than 80 °C (176 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0228 Phase VBp Heats. Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.
A0229 Phase WBp Heatsink high temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • It resets automatically after the cause is eliminated. • DIx. • Networks.	• Temperature higher than 75 °C (167 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fan. • Obstructed air inlet filter.
F0230 Phase WBp Heatsink over temperature	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Temperature higher than 80 °C (176 °F). • High ambient temperature (>40 °C or 104 °F) and high output current. • Defective or blocked fans. • Obstructed air inlet filters.
F0231 Phase WBp Heats. Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• Feedback circuit failure. • Fiber optic cables not connected, inverted or defective.
F0232 Output Volt. UBp Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • DIx. • Networks.	• For WEG use.

Fault/alarm	Reset	Possible causes
F0233 Output Volt. VBp Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• For WEG use.
F0234 Output Volt. WBp Feedback Fault	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• For WEG use.
F0236 DC Link Unbalance V	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• The difference between the positive and the negative DC link voltages >15 % of the rated value.
F0237 DC Link Unbalance W	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• The difference between the positive and the negative DC link voltages >15 % of the rated value.
F0238 DC Link Over Voltage V	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• The power supply voltage is too high producing a DC link voltage higher than the maximum (130 % of the nominal value). • The load inertia is too high or the deceleration ramp is too fast. • P0151 or P0153 setting is too high.
F0239 DC Link Over Voltage W	• Power-on. • Manual (/RESET key). • Auto-reset. • Dlx. • Networks.	• The power supply voltage is too high producing a DC link voltage higher than the maximum (130 % of the nominal value). • The load inertia is too high or the deceleration ramp is too fast. • P0151 or P0153 setting is too high.

8.2 INFORMATION FOR CONTACTING TECHNICAL SUPPORT

NOTE!
For technical support or servicing, it is important to have the following information at hand:

- Inverter model.
- Serial number, manufacturing date and hardware revision, which are available on the product identification label (refer to Section 2.3 IDENTIFICATION LABEL OF THE MVW01 on page 2-2).
- Software version (refer to Section 3.2 SOFTWARE VERSION on page 3-1).
- Application and programming data.

For explanations, training or services, please, contact WEG Technical Assistance.

8.3 SAFE DE-ENERGIZATION INSTRUCTIONS

1. Decelerate the motor to a complete stop.

2. Check the DC link voltage values of the installed power cells at parameters P1000 to P1035 da HMI.

3. Press the “POWER OFF” pushbutton. The input transformer switchgear should open at this moment, which is

indicated by the “INPUT ON” pilot light going off.

WARNING!
If the input transformer switchgear does not open with the “POWER OFF” command, then open it manually.

4. Monitor the decrease in DC link voltage through HMI parameter P0004 as well as the neon lamps mounted on the HVM Card. When the DC bus voltage drops below 200 V, the neon lamps start to flash less and less frequently until they go out completely.
Wait for the DC bus voltage indicated through HMI parameter P0004 to be below 25 V.

5. Press the emergency pushbutton located on the control column door and remove its key.

6. On the circuit breaker cabinet (switchgear) of the input transformer, switch off the switch disconnector and grounding of the inverter circuit. It is necessary to confirm visually the opening of the switch through the inspection window. Lock the cabinet and/or add warning sign indicating “System in maintenance”.

7. Switch off the Q2 circuit breaker in the control column and lock it in the open position with a padlock and/or put a warning sign indicating “System in maintenance”.

8. Switch off the Q1 circuit breaker in the control column. Remove the auxiliary power supply.

It is only after the sequence of procedures described above that high voltage compartment doors can be opened.

DANGER!
In cases where it is not possible to monitor the discharge of the DC bus capacitors via the HMI as well as the neon lamps mounted on the HVM Card due to a malfunction or a preliminary shutdown, follow instructions 5 to 8 above and wait for another 10 minutes.

9. Execute the procedures 2 and 3 of the Preventive Maintenance During Operation.

10. Clean the dust accumulated inside the control and high voltage cabinets as described next:

- Heatsink ventilation system (fans, rectifier and inverter arm heatsinks): remove the dust accumulated on the heatsink fins using compressed air.
- Electronic boards: remove the dust accumulated on the boards using an anti-static brush and/ or low pressure ionized compressed air. If necessary, remove the boards from the inverter.

WARNING!
Electronic boards have components sensitive to electrostatic discharges. Do not touch the components or connectors directly. If necessary, first touch the grounded metallic frame or wear a proper grounded wrist strap.

- Cabinet inner part and other components: remove the accumulated dust using a vacuum cleaner with a nonmetallic nozzle. Perform this cleaning especially on the insulating materials that support energized parts to avoid leakage currents during operation.

11. Connection retightening: inspect all the electrical and mechanical connections and retighten them if necessary.

12. Recoloque todos os componentes ou conexões removidas nas suas respectivas posições e siga os procedimentos de colocação em operação descritos na seção ENERGIZAÇÃO/COLOCAÇÃO EM FUNCIONAMENTO/DESENERGIZAÇÃO SEGURA no Manual do Usuário.

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