POWER ELECTRONICS

Technical data

Variable Speed Drive Type: Yaskawa A1000-Series

Type	Input			Output			
	Power	Fuse	Voltage	Current	I max for 60s	Power T=const.	Losses
CIMR-AC4	in kVA	in A	in V	in A	in A	in kW	in W
A0002FAA	1,4	6	400	1,8	2,7	0,37	61
A0004FAA	2,3	10	400	3,4	5,1	0,75	70
A0005FAA	4,3	10	400	4,8	7,2	1,50	87
A0007FAA	6,1	16	400	5,5	8,3	2,20	101
A0009FAA	8,1	20	400	7,2	10,8	3,00	108
A0011FAA	10,0	25	400	8,2	12,3	4,00	130
A0018FAA	14,6	36	400	14,8	22,2	5,50	221
A0023FAA	19,2	36	400	18,0	27,0	7,50	247
A0031FAA	28,4	50	400	24,0	36,5	11,00	323
A0038FAA	37,5	63	400	31,0	46,5	15,00	403
A0044FAA	39,3	80	400	39,0	59,0	18,50	509
A0058AAA	46,6	100	400	45,0	67,0	22,00	518
A0072AAA	53,0	125	400	60,0	90,0	30,00	701
A0088AAA	64,9	160	400	75,0	112,0	37,00	817
A0103AAA	78,6	160	400	91,0	136,0	45,00	1022
A0139AAA	96,0	225	400	112,0	168,0	55,00	1325
A0165AAA	129,9	250	400	150,0	225,0	75,00	1920
A0208AAA	155,0	300	400	180,0	270,0	90,00	2313
A0250AAA	189,0	350	400	216,0	324,0	110,0	3075
A0296AAA	227,0	450	400	260,0	390,0	132,0	3178
A0362AAA	274,0	600	400	304,0	456,0	160,0	4060
A0414AAA	316,0	700	400	370,0	555,0	185,0	4742
A0515AAA	375,0	900	400	450,0	675,0	220,0	5358
A0675AAA	508,0	1000	400	605,0	907,0	315,0	5875

	Weight	Dimensions	EMC-Filter	
			Name	Dimensions
CIMR-AC4	in kg	W x H x D (mm)		WxHxT (mm)
A0002FAA	3,2	140x260x147	**FB-4008A	140x301x50
A0004FAA	3,2	140x260x147	**FB-4008A	140x301x50
A0005FAA	3,2	140x260x147	**FB-4008A	140x301x50
A0007FAA	3,4	140x260x164	**FB-4008A	140x301x50
A0009FAA	3,5	140x260x164	**FB-4014A	140x301x50
A0011FAA	3,5	140x260x164	**FB-4014A	140x301x50
A0018FAA	3,9	140x260x167	**FB-4025A	140x301x50
A0023FAA	3,9	140x260x167	**FB-4025A	140x301x50
A0031FAA	5,4	180x300x167	**FB-4044A	140x301x50
A0038FAA	5,7	180x300x187	**FB-4044A	140x301x50
A0044FAA	8,3	220x350x197	FB-4060A	85x310x135
A0058AAA	21,0	250x400x258	FB-4060A	85x310x135
A0072AAA	25,0	275x450x258	FB-4072A	85x310x135
A0088AAA	36,0	325x510x258	FB-4105A	95x325x150
A0103AAA	36,0	325x510x258	FB-4105A	95x325x150
A0139AAA	41,0	325x550x283	FB-4170A	130x440x181
A0165AAA	42,0	325x550x283	FB-4170A	130x440x181
A0208AAA	79,0	450x705x330	FB-4250A	155x525x220
A0250AAA	96,0	500x800x350	FB-4250A	155x525x220
A0296AAA	102,0	500x800x350	FB-4414A	300x500x130
A0362AAA	107,0	500x800x350	FB-4414A	300x500x130
A0414AAA	125,0	500x950x370	FB-4414A	300x500x130
A0515AAA	216,0	670x1140x370	FB-4675A	300x500x130
A0675AAA	221,0	670x1140x370	FB-4675A	300x500x130
			** Footprint-Filter	

Caution: The max. current of the compressor should be less than the rated current of the inverter.

General technical data:

	Name	Specification:
Input	Iinput Voltage Line frequency	3-Phase 400V -15% to +10% 50/60Hz +/- 5%
Output	Output frequency Overload capacity	0,01 to 400Hz Default setting: 30-60Hz 150% for 60s (HD)
Environment	Ambient temperature Humidity Storage temperature Altitude Vibration	-10°C to 50°C < 95%, non condensating -20°C to 60°C Max. 1000m Output de-rating >1000m 1% per 100m max. 3000m max. 5,9m/s²
Misc	Safety standards IP-Rate	UL508C; EN954-1 Kat.3 IEC/EN61508 SIL2 IP20 or IP54 (22.0 to 75kW)

POWER ELECTRONICS

Variable Speed Drives YASKAWA A1000 - series

Short manual:
A1000 with Software for speed control of compressors with integrated compound controller

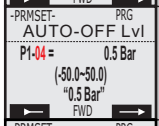
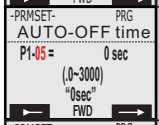
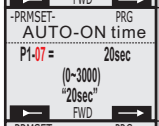
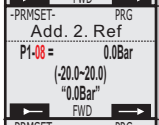
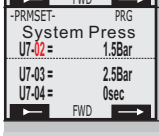
PED
Power Electronics Deutschland GmbH
Dieselstrasse 77
90441 Nürnberg

Tel.: +49 911 99 43 99 - 0
Fax.: +49 911 99 43 99 - 8
E-mail: info@ped-deutschland.de

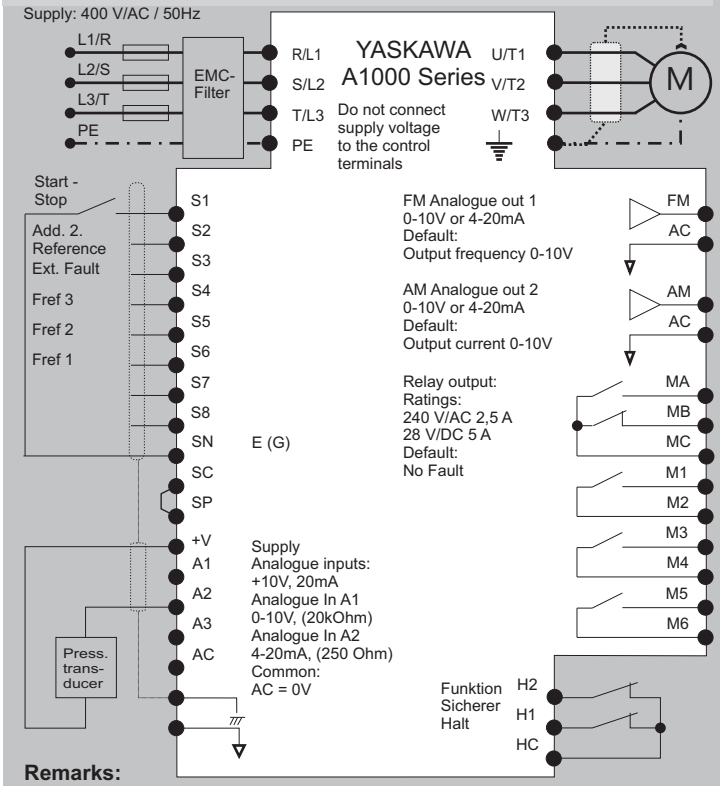
L1 Standard refrigeration parameter

▶ Desciption
▶ Parameter Number
▶ Range
▶ Default

Change during while A1000 is running is permitted. Values highlighted in RED are different from default settings.
▶ Parameter-Description

	Sensor lower level	N	The parameter P1-01 and P1-02 determine together the range of the pressure transducer. These settings are the reference to show the system pressure in real values in the display. Only transducers with the following specification can be used: Voltage range: 8 to 30V/DC Pressure range: -0,8 to 7,0 Bar. Other values on demand.
	Sensor upper level	N	
	Pressure reference setpoint in Bar	Y	This parameter determines the setpoint for the suction pressure in the system.
	AUTO-OFF Pressure in Bar	Y	Once the pressure level in the system is underneath the value in parameter P1-04 for the time set in parameter P1-05 the drive will switch automatically OFF. Example: According to factory settings the pressure must be for 10.0s below 1,5 Bar, then the drive is switching itself off.
	AUTO-OFF Pressure time in sec	Y	
	AUTO-ON Pressure (Hysteresis)	Y	Once the pressure exceeds the value set in P1-06 + P1-04 for the time set in parameter P1-07 the inverter will automatically switch on again. Example: P1-04 = 1,5Bar; P1-06 = 1,0Bar ON Pressure: 1,5Bar + 1,0Bar = 2,5Bar
	AUTO-ON Pressure time in sec	Y	
	2. reference via digital input	Y	Once a digital input has been set to mode "80" the pressure reference will change in accordance to the setting in case this input becomes active. Example: P1-03 = 3,0Bar; P1-08 = -2,0Bar --> New reference: 1,0 Bar.
	Display of the system pressure	N	Shows the system pressure and will be scaled in parameter P1-01 and P1-02 U7-02 System pressure U7-03 Pressure reference (P1-03)

L1.2 Standard-Wiring

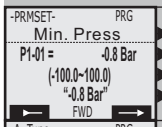


Remarks:
All settings are prepared for a pressure transducer with the folllowing specification:Voltage: 8-30V/DC; Signal: 4-20mA; Range: -0,8 to 7,0 Bar
Other values can be adapted by setting of the parameter P1-01/-02.

R1 Standard-Wiring

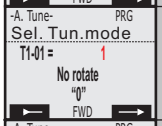
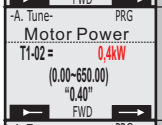
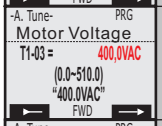
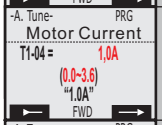
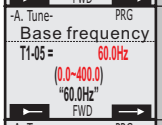
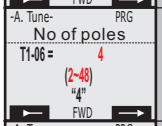
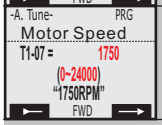
Autotuning, Safety-, EMC-recommendations R8

The autotuning - function will measure and adjust all required motor data automatically. It is recommended to use the autotuning function with a new commissioning.If this is not possible, the function "Autotuning with no rotate" should be choosen. Non correct settings will interrupt the autotuning process,



▶ Desciption
▶ Parameter Number
▶ Range
▶ Default

Change during while A1000 is running is permitted. Values highlighted in RED are different from default settings.
▶ Parameter-Description

	Auto-Tuning Mode	N	0=Rotating Autotuning (Vector-controlled) 1=Stationary Autotuning (Vector controlled) 2=Stationary Autotuning for line to line resistance. (Recommended) Choose mode and follow the menu..
	Motor rated shaft power	N	Setup of the nameplate motor power in kW. This parameter generates the basis data to start with the autotuning function. Default values are depending on the inverter size.
	Motor rated voltage	N	The motor rated voltage is needed to adjust the V/Hz curve. Example: Motor 230/400V Delta E1-13 = 230V; E1-06 = 50Hz; E1-04 = 87Hz; Max. frequency E1-06 = Motor rated frequency.
	Motor rated current	N	With the setting of the motor rated current the A1000 could calculate a thermal model of the connected motor.This will prevend the motor to get overlaoded (Fault: OL1)
	Motor rated frequency	N	The base frequency of the motor determines the nameplate frequency of the connected motor.
	Amount of Motor poles	N	The number of motor poles is used to input data for the autotuning function.
	Motor rated speed	N	Text message after successful autotuning: "Tuning successful" Repeat procedure once autotuning was interrupted with fault message.

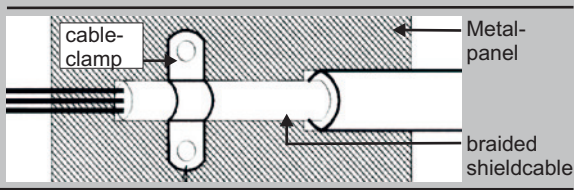
Pess "RUN" Key

RUN START >>>>> GOAL

Text message after successful autotuning:
"Tuning successful"
Repeat procedure once autotuning was interrupted with fault message.

Safety and EMC - recommendations R8.1

Operation	The operation of the drive must be in accordance the safetey regulations of the manual SIEPC710606 19A page 12. Commissioning and maintenance is only allowed throughout qualified and trained personal.
Power Off	After power Off the DC-bus voltage may remain up to 5 further minutes. Therefore before opening or serviceing it is required to measure the DC-bus voltage to confirm a safe level.
Product-norms	All devices were tested through authorized institutions and are in accordance with the following standards: - EN61800-3:1996 - EN61800-3; A11:2000 All drives of the A1000 series are certified with: CE, UL, c-UL.
EMC-filter	For legal reasons it is required to meet the EMC standards. Therefore the EMC filters listed at page R2 must be used. If the EMC filters are correctly installed the drive will meet class "B" of the EN 55011. All filters are designed as footprint filters to be mounted underneath the A1000 series.
Motor cable (max. 50m)	It is highly recommended to use braided shield cables. The cable shield must be grounded on both sides. Wiring should be done as short as possible.
Control wiring (max. 50m)	All control cables should be shielded and must not be used together with power cables.
RCD Devices	The use of a standard earth leakage breaker (RCD) may not work, the breaker might trip before or not proper. It is highly recommended to choose a breaker specially designed for variable speed drives.



Autotuning, Safety and EMC R8

R7 Fault memory

Fault: ▶	Description ▶	Cause / *Action* ▶
GF	Ground fault	Current shorted to ground exceeded 50% motor current. ***Test of the A1000 without motor connected*** ***Check motor insulation***
OC	Overcurrent	Output current of the A1000 is too high. ***Test with motor disconnected, Check motor insulation*** ***Eventually increese acceleration time in C1-01.***
LF2	Current Imbalance	Output current imbalance. ***One motor phase at the output is missing, check wiring of the connected motor.***
ov	Über-spannung	The DC-bus voltage has reached a value of 820V/DC. ***Increase the deceleration ramp rate.*** ***Check supply voltage (< 480V/AC +10%)***
uv1	DC-Bus too low	The DC-bus voltage is below 380V/DC. ***Check supply voltage and connections (> 350V/AC)***
uv2	Controlvolt. too low	The control voltage has reached a critical level. ***Check control terminals on short circuits or high consumption; Switch OFF and ON***
uv3	Soft charge circuitry	Fault while DC-bus capacitors were soft charged. ***Power OF and ON again, if problem still exist unit needs to be replaced.***
PF	Input Phase loss	Ripple in the DC-bus too high (only if L8-05=1) ***Check supply voltage***
LF	Output phase loss	Phase loss at the output (only if L8.07 = 1) Cable break at the motor cables, underload ***Check motor power and cabling***
oh	Over temperature	The heatsink temperature has exceeded 105°C. ***Check drive fan, ambient temperature and dust filter.***
oL1	Motor overload	Motor overload due to the thermal model of the V1000 which has calculated an overload, ramp rates too short ***Check motor rated current in E2-01*** ***V/Hz curve in E1-02*** ***Check acceleration ramp rate in C1-01 evtl. too short*** ***Check deceleration ramp rate in C1-02 evtl. too short***
oL2	A1000 overload	Variable speed drive overloaded Load too high, Ramp rates too short ***Check rated current in E2-01*** ***V/Hz curve in E1-02*** ***Check acceleration ramp rate in C1-01 evtl. too short*** ***Check deceleration ramp rate in C1-02 evtl. too short***
uL3	A1000 underload	Torque below setting (only if L6-01 = 7 or 8) Belt monitoring ***Check mechanical setup***
FbL	PID feedback loss	PID-feedback loss (only if B5-12 = 2) **Check pressure transducer**
EF3	External Fault 3	External fault at digital input S3 EF4 = S4; EF5 = S5; EF6 = S6; EF7 = S7 ***Check control wiring and find what has caused this.***
CPF--	CPF XX Fault	Control board failure ***Power OF and ON again, if problem still exist unit needs to be replaced.***

Alarm messages R6.1

Alarms shall protect the A1000 and do not cause tripping of the inverter. During alarm the display is blinking. After fixing the problem which has caused the alarm the V1000 returns automatically back to the status which was in case before the alarm.

Programming failures (OPE) R6.2

OPE01	kVA failure	Failure A1000 sizing on parameter 02-04 ***Check input data of parameter O2-04 via display.***
OPE02	Range exceeded	Failure A1000 sizing on parameter 02-04 ***Check input data of parameter O2-04 via display.***
OPE03	Double Input	Some of the digital inputs were programmed with the same function or mode. ***Ceck digital inputs.***

Autotuning Faults (Er) R6.3

Er-01	Motor data fault	Failure data input, difference between motor power setting and motor current adjustment. ***Check motor data***
Er-02	Alarm	Fault during autotuning. ***Check motor data, wiring and load, repeat autotuning***

Failure copy function of the display R6.4

PrE	Write protection	Failure write/read function from/to the display. Protection mode still active. ***Change Parameter 03-02 = Mode 1***
CAE	Wrong device	Drive data are not correct. ***Ceck data in parameter o2-04.***

R7.5 Messsage “COMP” Sequence

ComP	Too many compressor Starts	Alarm message once the amount of starts according to parameter P2-05 were exceeded. Remarks: This message will be reset automatically once the intervall time is passed. Example: P2-05= 10 --> 10 Starts per hour, a new start of any compressor in the system wouldle every 6 minutes. Once a start demand is required and 4 minutes are elapsed this message will appear for 2 minutes and after this time the compressor will be started the message disappears.

Caution: These messages are selected from the manual and are not complete.
Manual: YEG-SIEP C7 10606 27c

R7 Fault memory

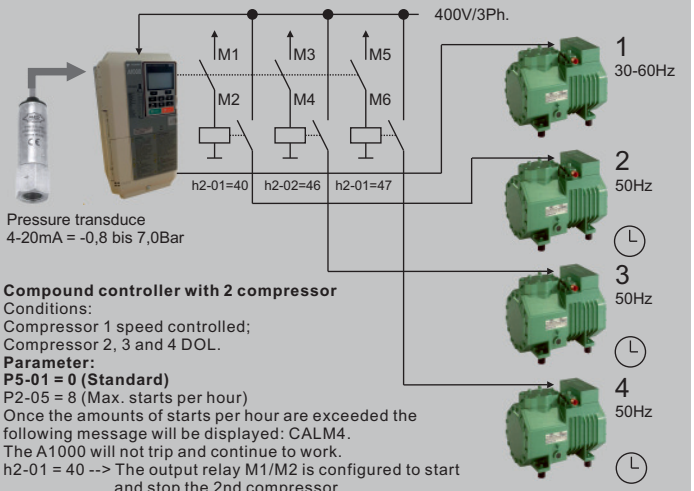
Compound Controller Standard L2.1

The standard compound controller of the A1000 is always a compressor no1 which is speed controlled by the A1000 and up to 3 further compressors which can by switched ON and OFF by the inverter via contactors.
The compressors are time controlled activated, first compressor active will be that one with the lowest working hours..
Generally all compressors are named as follows:

+ Speed controlled compressor:	Compressor 1
+ 1. Compound compressor:	Compressor 2
+ 2. Compound compressor:	Compressor 3
+ 3. Compound compressor:	Compressor 4

-PRMSET- PRG Sequence P5-01 = 0 Time “0” FWD	Sequence Compound ON	N	In case of further compressors in the Rack this parameter determines the sequence to switch the compound compressors ON and OFF: **0 --> Time controlled; 1st at variable speed drive and up to 3 further compressors switched ON/OFF depending on need and working hours.** 1 --> LI-FO (See L3) 2 --> Auto-Change (See L4) 3 --> Twin Compressor (See L5)
-PRMSET- PRG Freq. Comp ON P2-01 = 58,0Hz (30.0 ~ 60.0) “58,0Hz” FWD	Frequency to switch ON Compound Compressor	N	Once the output frequency has exceeded the value set in the parameter P2-01 for the time set in parameter P2-02 the A1000 will activate a digital output. Normally this parameter is set to max. output speed. In cases with compressors of different sizes, this function can be used to adjust the compound controller.
-PRMSET- PRG Time Comp ON P2-02 = 10sec (0 ~ 3000) “10sec” FWD	Time to switch ON Compound Compressor	N	
-PRMSET- PRG Press Comp OFF P2-03 = 3.0 Bar (-100.0-100.0) “3.0 Bar” FWD	Level Compound Compressor OFF	N	Once the feedback value is below the value set in this parameter for the time set in parameter P2-04 the A1000 will de-activate the outputs for comressors no 2-4. Before the relevant digital output needs to be configured in Mode “40, 46 and 47 ”. Output M1/M2: H2-01 Mode 40 Output M3/M4: H2-02 Mode 46 Output M5/M6: H2-03 Mode 47
-PRMSET- PRG Time Comp OFF P2-04 = 10sec (0 ~ 3000) “10sec” FWD	Compound Compressor OFF	N	
-PRMSET- PRG Max. Starts/h P2-05 = 0 (0 ~ 25) “0” FWD	Max. Starts/h	N	Normally the amount of starts per hour is limited due to a possible thermal overloadin case compressors are started direct on line (DOL). This parameter prevents the 2nd compressor. “0” ‘= OFF
-MODE- DRV Rdy Countdown Rel. U7-04 = 0.5 sec U7-05 = 3.5 Std U7-06 = 9.5 Bar FWD	Countdown Timer for output relays	N	Once the conditions to switch the 2nd compressor ON or OFF are reached a down counter occurs in the display indicating the remaining time to switch ON or OFF in seconds.
-PRMSET- PRG Term M1-M2 H2-01 = 40 Verbund Schalt “0” FWD	Compound Mode for the digital Outputs	N	Once a digital output is foreseen to activate a further compressor the relevant output must be configured to “40/46/47”. h2-01 --> M1/M2; h2-02 --> M3/M4; h2-03 --> M5/M6

L3.2 Example compound controller



Compound controller with 2 compressor
Conditions:
Compressor 1 speed controlled;
Compressor 2, 3 and 4 DOL.
Parameter:
P5-01 = 0 (Standard)
P2-05 = 8 (Max. starts per hour)
Once the amounts of starts per hour are exceeded the following message will be displayed: CALM4.
The A1000 will not trip and continue to work.
h2-01 = 40 --> The output relay M1/M2 is configured to start and stop the 2nd compressor.
h2-02 = 46 --> The output relay M3/M4 is configured to start and stop the 3rd compressor.
h2-03 = 47 --> The output relay M5/M6 is configured to start and stop the 4th compressor.
P2-01 = 58Hz; Once the output speed is above 58Hz, the timer in P2-02 starts.
P2-02 = 30s; Time to switch on the next compressor (2,3 or 4)

U7-04 = Shows the remaining time in seconds once timer P2-02 began to run.
P2-03 = 2,5 Bar; Once the pressure is below this value, the timer in P2-04 starts.
P2-04 = 10s; Time to switch OFF compressor no 2,3 or 4

U7-04 = Shows the remaining time in seconds once the timer P2-04 began to run.

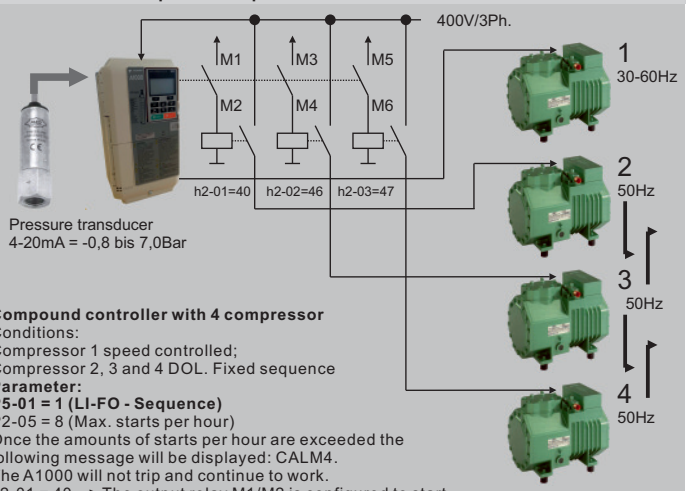
Compound controller Standard L2

L3.1 Compound Controller (LI-FO Sequence)

The standard compound controller of the A1000 is always a compressor no1 which is speed controlled by the A1000 and up to 3 further compressors which can by switched ON and OFF by the inverter via contactors.
The compressors will be activated and de-activated always in the same sequence. The compressor No2 (M1/M2) will be the first on, compressor No3 (M3/M4) will be the second and No4 (M5/M6) will be the last. The sequence to switch OFF is vice versa.
In case less compressors are in the rack, the sequence is identicall.

-PRMSET- PRG Sequence P5-01 = 1 Time "0" FWD	Sequence Compound ON	N	In case of further compressors in the Rack this parameter determines the sequence to switch the compound compressors ON and OFF: 0 --> Time controlled (See L2) **1 --> LI-FO** 2 --> Auto-Change (See L4) 3 --> Twin Compressor (See L5)
-PRMSET- PRG Freq. Comp ON P2-01 = 58,0Hz (30.0 ~ 60.0) "58,0Hz" FWD	Frequency to switch ON Compound Compressor	N	Once the output frequency has exceeded the value set in the parameter P2-01 for the time set in parameter P2-02 the A1000 will activate a digital output. Normally this parameter is set to max. output speed. In cases with compressors of different sizes, this function can be used to adjust the compound controller.
-PRMSET- PRG Time Comp ON P2-02 = 10sec (0 ~ 3000) "10sec" FWD	Time to switch ON Compound Compressor	N	
-PRMSET- PRG Press Comp OFF P2-03 = 3.0 Bar (-100.0-100.0) "3.0 Bar" FWD	Level Compound Compressor OFF	N	Once the feedback value is below the value set in this parameter for the time set in parameter P2-04 the A1000 will de-activate the outputs for comressors no 2-4. Before the relevant digital output needs to be configured in Mode "40, 46 and 47 ". Output M1/M2: H2-01 Mode 40 Output M3/M4: H2-02 Mode 46 Output M5/M6: H2-03 Mode 47
-PRMSET- PRG Time Comp OFF P2-04 = 10sec (0 ~ 3000) "10sec" FWD	Time Compound Compressor OFF	N	
-PRMSET- PRG Max. Starts/h P2-05 = 0 (0 ~ 25) "0" FWD	Max. Starts/h	N	Normally the amount of starts per hour is limited due to a possible thermal overloadin case compressors are started direct on line (DOL). This parameter prevents the 2nd compressor. "0" '= OFF
-MODE- DRV Rdy Countdown Rel. U7-04 = 0.5 sec U7-05 = 3.5 Std U7-06 = 9.5 Bar FWD	Countdown Timer for output relays	N	Once the conditions to switch the 2nd compressor ON or OFF are reached a down counter occurs in the display indicating the remaining time to switch ON or OFF in seconds.
-PRMSET- PRG Term M1-M2 H2-01 = 40 Verbund Schalt "0" FWD	Compound Mode for the digital Outputs	N	Once a digital output is foreseen to activate a further compressor the relevant output must be configured to "40/46/47". h2-01 --> M1/M2; h2-02 --> M3/M4; h2-03 --> M5/M6

L3.2 Example compound controller LI-FO mode



Compound controller with 4 compressor
Conditions:
Compressor 1 speed controlled;
Compressor 2, 3 and 4 DOL. Fixed sequence
Parameter:
P5-01 = 1 (LI-FO - Sequence)
P2-05 = 8 (Max. starts per hour)
Once the amounts of starts per hour are exceeded the following message will be displayed: CALM4.
The A1000 will not trip and continue to work.
h2-01 = 40 --> The output relay M1/M2 is configured to start and stop the 2nd compressor.
h2-02 = 46 --> The output relay M3/M4 is configured to start and stop the 3rd compressor.
h2-03 = 47 --> The output relay M5/M6 is configured to start and stop the 4th compressor.
P2-01 = 58Hz; Once the output speed is above 58Hz, the timer in P2-02 starts.
P2-02 = 30s; Time to switch on the next compressor (2,3 or 4)

U7-04 = Shows the remaining time in seconds once timer P2-02 began to run.
P2-03 = 2,5 Bar; Once the pressure is below this value, the timer in P2-04 starts.
P2-04 = 10s; Time to switch OFF compressor no 2,3 or 4

U7-04 = Shows the remaining time in seconds once the timer P2-04 began to run.

Monitor Screens II; Pressure Monitor U7-XX R6

-MODE- DRV Rdy System Press. U7-02 = 1.5 Bar U7-03 = 1.0 Bar U7-04 = 0.5 sec FWD	Shows the actual suction pressure and is determined by the value of analogue input A2 and the scaling of parameter P1-01 and P1-02. This is screen is always shown after power ON if the A1000 is set to default mode.
-MODE- DRV Rdy Press. Reference U7-03 = 1.0 Bar U7-04 = 0.5 sec U7-05 = 3.5 Std FWD	Shows the pressure reference in Bar and is set in Parameter P1-03. The default value is 1.0 Bar.
-MODE- DRV Rdy Countdown Rel. U7-04 = 0.5 sec U7-05 = 3.5 Std U7-06 = 9.5 Bar FWD	Once the conditions to switch the compound compressors ON or OFF are fulfilled a countdown timer starts to run down to "0". Example: P2-01 = 58Hz and P2-02 = 30s. Once the output frequency exceeds 58Hz the countdown starts from 30s to 0s if the output frequency remains above 58Hz..
-MODE- DRV Rdy Maintenance time U7-05 = 3.5 Std U7-06 = 9.5 Bar U7-07 = 19.5 % FWD	Shows the remaining time for the next maintenance of the system and is depending on the settings of P3-03. Once the time is elapsed the message "CALM4" appears in the display. This is only an alarm meassage and does **not** cause a trip of the variable speed drive.
-MODE- DRV Rdy Cond. Press. U7-06 = 9.5 Bar U7-07 = 19.5 % U7-08 = 30.0 Std FWD	Once a 0-10V pressure transducer is connected at analogue input A3, the condensing pressure will be displayed in this screen. The screen can be scaled with parameters P6-01 and P6-02.
-MODE- DRV Rdy Fan Volt. U7-07 = 19.5 % U7-08 = 30.0 Std U7-09 = 28.0 Std FWD	An internal PI-controller (P6-04 and P6-05) generates a signal for the cndensing fan. This signal is based on the setting of the pressure reference in P6-03 and the actual condensing pressure from analogue input A3. This value will be passed on to the analogue output as a 0-10V signal if parameter h4-01 is set to "707" (Condensing pressure).
-MODE- DRV Rdy Hours Comp2 U7-08 = 30.0 Std U7-09 = 28.0 Std U7-10 = 29.0 Std FWD	Shows the actual running hours if parameter h2-01 was set to mode "40" and a compressor relay was connecet to the terminals M1/M2.
-MODE- DRV Rdy Hours Comp3 U7-09 = 30.0 Std U7-10 = 28.0 Std U7-01 = CASE FWD	Shows the actual running hours if parameter h2-02 was set to mode "46" and a compressor relay was connecet to the terminals M3/M4.
-MODE- DRV Rdy Hours Comp4 U7-10 = 30.0 Std U7-01 = CASE U7-02 = 1.5 Bar FWD	Shows the actual running hours if parameter h2-03 was set to mode "47" and a compressor relay was connecet to the terminals M5/M6.
-MODE- DRV Rdy CASE SW Nr U7-01 = 00501 U7-01 = CASE U7-02 = 1.5 Bar FWD	Shows the actual software version.

Error messages A1000 refrigeration software R6.2

-MONITOR- DRV Rdy EgCY Emergency Mode FWD	Once the feedback signal gets lost while the A1000 is running and emergency mode in parameter P2-10 is active (Mode 1), the A1000 will run at a fixed speed set in parameter P3-04 and show this message on the display.
-MONITOR- DRV Rdy FbLST Feedback lost FWD	Once the feedback signal gets lost while the A1000 is running and emergency mode in parameter P2-10 is not active (Mode 0), the A1000 will trip and show this meassage on the display.
-MONITOR- DRV Rdy CMPd Compr. Fault FWD	In case more compressors are running in compound mode, the fault conditions of each compressor can be read via a digital input, see section "L8". If a compressor fault occurs during run (High pressue fault, motor thermal protection), the A1000 wil de-activate this compressor and activate an alternative compressor.
-MONITOR- DRV Rdy PrSSr Press. Fault FWD	In case the system pressure drops by the value set in parameter P5-03 (Default 5.0 Bar) within the time set in P5-04 (default: 2.0s) a bursted tube could cause system damages. To prevent further problems the A1000 will switch OFF with error message "PrSSr". This function can be de-activated with parameter P5-04 set to 0.0.

R5 Monitor screens U1-XX

Mode: ▶	Description ▶	Function: ▶
01	Frequency reference	Shows the value of the frequency reference. This reference is not used in the refrigeration software. Min. unit: 0,01 Hz
02	Output frequency	Shows the current output frequency. Min. Unit: 0,01 Hz
03	Output current	Shows the output current. Unit: 0,01 A
06	Output voltage	Shows the momentary output voltage Min. Unit: 0,1 V
07	DC-Bus voltage	Shows the DC-Bus voltage UDC/√2=Input or supply voltage 565V/DC / 1,414 = 400V Uin
08	Output power	Shows the putput power in kW. Min. Unit: 0,1 KW
10	Input terminals status	U1-10 = ▮▮▮▯▮▮▯▮ (S6 S5 S4 S3 S2 S1) Example see left side: Terminals S1 and S4 = Signal Rest = no Signal
11	Output terminals Status	U1-11 = ▮▮▮▮▮▮▯▮ (n. used, P2 P1 MA PCPCMC) Example see left side: Relay MA/MC = active P1/PC and P2/PC = not active
13	Level terminal A1	Shows the input level at analogue input A1. 0% --> 0V or -10V (according to h3-01) 100% --> 10V
14	Level terminal A2	Shows the input level at analogue input A2. 0% --> 0V; -10V or 4 mA (according to h3-09) 100% --> +10V or 20mA
15	Level terminal A3	Shows the input level at analogue input A3. 0% --> 0V; -10V (according to h3-05) 100% --> +10V

R5.1 Fault monitoring U2-XX

01	Actual fault	Shows the failure code of the actual fault. Failure code according to table R9 No fault = NONE
02	Last fault	Shows the failure code of the last fault. Failure code according to table R9 No fault = "NONE"
03	Reference at last fault	Shows the reference speed while the drive was tripping last time.
04	Output frequency at last fault	Shows the output speed while the drive was tripping last time.
05	Output current at last fault	Shows the output current while the drive was tripping last time.
08	DC-Bus voltage at last fault	Shows the DC-Bus voltage while the drive was tripping last time.
11	Status Input terminals	U1-10 = ▮▮▮▯▮▮▯▮ (S7 S6 S5 S4 S3 S2 S1) Shows the status of the input terminals while the drive was tripping last time.
14	Running time at last fault	Shows the running time while the drive was tripping last time.

R5.2 Fault history U3-XX

01	Failure code last fault	U3-02 failure code 2nd most recent fault U3-03 failure code 3rd most recent fault U3-XX .....
09	Failure code 9th most recent fault	U3-09 failure code 9th most recent fault U3-10 Operation time last fault U3-11 Operation time 2nd most recent fault
11	Operation time last fault	U3-12 Operation time 3rd most recent fault U3-XX ..... U3-20 Operation time 9th most recent fault
20	Operation time 9th most recent fault	

Important:
The following failure codes will be not monitored in the fault history screens:
CPF00 Fault display communication
CPF01 Fault display communication
CPF03 EEPROM failure
UV1 Low voltage fault
UV2 Low voltage control supply

R5.3 Maintenance Monitor U4-XX

01	Accumulated operation time	Shows the total operation time of the drive and can be reset with parameter o4-01.
02	Number of RUN commands	Displays the number of times the RUN command has been entered and can be reset with parameter O4-13.
08	heatsink temperature	Shows the heatsink temperature in °C.
13	Max. output current	Displays the max. current during RUN status.

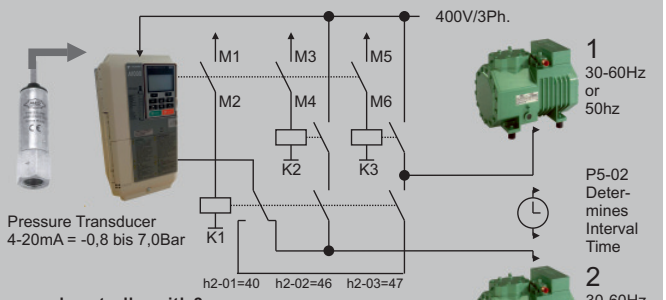
This is only a selection from the Yaskawa manual YEG-SIEP C7 10606 27c of the screens mostly in use and does not demand any requirements for completeness.

Compound Controller ACC **A**uto-**C**hange-**C**ontrol L4.1

To ensure a balanced oil flow inside the refrigeration system with two compressors. Both compressors are controlled by the A1000, either with variable speed or direct on line. The A1000 changes automatically the compressor which will be driven by the inverter in the intervall time set in parameter P5-02. On demand the second compressor will be added direct on line, controlled by the A1000.
Particulary in winter time it may happen that there is always a demand for only one compressor, by changing over the compressor in fixed intervall times it will be prevented that compressor may start without oil inside.

-PRMSET- PRG Sequence P5-01 = 0 Time "0" FWD	Sequence Compound ON	N	In case of further compressors in the Rack this parameter determines the sequence to switch the compound compressors ON and OFF: 0 --> Time controlled; 1st at variable speed drive and up to 3 further compressors switched ON/OFF depending on need and working hours. (See L2) 1 --> LI-FO (See L3) **2 --> Auto-Change** 3 --> Twin Compressor (See L5)
-PRMSET- PRG Auto Time P5-02 = 30min (0 ~ 3000) "10sec" FWD			
-PRMSET- PRG Freq. Comp ON P2-01 = 58,0Hz (30.0 ~ 60.0) "58,0Hz" FWD	Frequency to switch ON Compound Compressor	N	Once the output frequency has exceeded the value set in the parameter P2-01 for the time set in parameter P2-02 the A1000 will activate a digital output. Normally this parameter is set to max. output speed. In cases with compressors of different sizes, this function can be used to adjust the compound controller.
-PRMSET- PRG Time Comp ON P2-02 = 10sec (0 ~ 3000) "10sec" FWD	Time to switch ON Compound Compressor	N	
-PRMSET- PRG Press Comp OFF P2-03 = 3.0 Bar (-100.0-100.0) "3.0 Bar" FWD	Level Compound Compressor OFF	N	Once the feedback value is below the value set in this parameter for the time set in parameter P2-04 the A1000 will de-activate the outputs for comressors no 2-4. Before the relevant digital output needs to be configured in Mode "40, 46 and 47 ". Output M1/M2: H2-01 Mode 40 Output M3/M4: H2-02 Mode 46 Output M5/M6: H2-03 Mode 47
-PRMSET- PRG Time Comp OFF P2-04 = 10sec (0 ~ 3000) "10sec" FWD	Compound Compressor OFF	N	
-PRMSET- PRG Max. Starts/h P2-05 = 0 (0 ~ 25) "0" FWD	Max. Starts/h	N	Normally the amount of starts per hour is limited due to a possible thermal overloadin case compressors are started direct on line (DOL). This parameter prevents the 2nd compressor. "0" '= OFF
-MODE- DRV Rdy Countdown Rel. U7-04 = 0.5 sec U7-05 = 3.5 Std U7-06 = 9.5 Bar FWD	Countdown Timer for output relays	N	Once the conditions to switch the 2nd compressor ON or OFF are reached a down counter occurs in the display indicating the remaining time to switch ON or OFF in seconds.
-PRMSET- PRG Term M1-M2 H2-01 = 40 Verbund Schalt "0" FWD	Compound Mode for the digital Outputs	N	Once a digital output is foreseen to activate a further compressor the relevant output must be configured to "40/46/47". h2-01 --> M1/M2; h2-02 --> M3/M4; h2-03 --> M5/M6

Example compound controller ACC - Mode L4.2



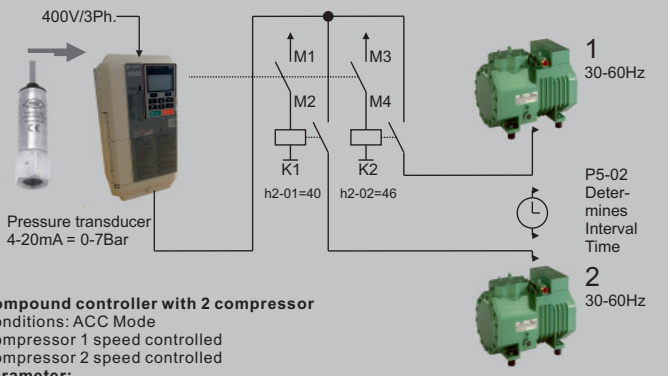
Compound controller with 2 compressor
Conditions: ACC Mode
Compressor 1 speed controlled or DOL
Compressor 2 speed controlled or DOL
Parameter:
P5-01 = 2 (ACC)
P5-02 = 30min Intervall time
h2-01 = 40 --> The output relay M1/M2 is configured to change over between compressor no 1 and compressor no 2.
h2-02 = 46 --> The output relay M3/M4 is configured to start and stop the 1st compressor.
h2-03 = 47 --> The output relay M5/M6 is configured to start and stop the 2nd compressor.
P2-01 = 58Hz; Once the output speed is above 58Hz, the timer in P2-02 starts.
P2-02 = 30s; Time to switch on the second compressor DOL
U7-04 = Shows the remaining time in seconds once timer P2-02 began to run.
P2-03 = 2,5 Bar; Once the pressure is below this value, the timer in P2-04 starts.
P2-04 = 10s; Time to switch OFF compressor running DOL

L5.1 Compound Controller TCC **T**win-Comp.-**C**ontrol

To ensure a balanced oil flow inside the refrigeration system with two compressors. Both compressors are controlled by the A1000, either with variable speed or direct on line. The A1000 changes automatically the compressor which will be driven by the inverter in the intervall time set in parameter P5-02. On demand the second compressor will be added direct on line, controlled by the A1000.
Particulary in winter time it may happen that there is always a demand for only one compressor, by changing over the compressor in fixed intervall times it will be prevented that compressor may start without oil inside.

-PRMSET- PRG Sequence P5-01 = 3 Time "0" FWD	Sequence Compound ON	N	In case of further compressors in the Rack this parameter determines the sequence to switch the compound compressors ON and OFF: 0 --> Time controlled; 1st at variable speed drive and up to 3 further compressors switched ON/OFF depending on need and working hours. (See L2) 1 --> LI-FO (See L3) 2 --> Auto-Change (see L4) **3 --> Twin Compressor**
-PRMSET- PRG Auto Time P5-02 = 30min (0 ~ 3000) "10sec" FWD			
-PRMSET- PRG Freq. Comp ON P2-01 = 58,0Hz (30.0 ~ 60.0) "58,0Hz" FWD	Frequency to switch ON Compound Compressor	N	Once the output frequency has exceeded the value set in the parameter P2-01 for the time set in parameter P2-02 the A1000 will activate a digital output. Normally this parameter is set to max. output speed. In cases with compressors of different sizes, this function can be used to adjust the compound controller.
-PRMSET- PRG Time Comp ON P2-02 = 10sec (0 ~ 3000) "10sec" FWD	Time to switch ON Compound Compressor	N	
-PRMSET- PRG Press Comp OFF P2-03 = 3.0 Bar (-100.0-100.0) "3.0 Bar" FWD	Level Compound Compressor OFF	N	Once the feedback value is below the value set in this parameter for the time set in parameter P2-04 the A1000 will de-activate the outputs for comressors no 2-4. Before the relevant digital output needs to be configured in Mode "40, 46 and 47 ". Output M1/M2: H2-01 Mode 40 Output M3/M4: H2-02 Mode 46
-PRMSET- PRG Time Comp OFF P2-04 = 10sec (0 ~ 3000) "10sec" FWD	Compound Compressor OFF	N	
-PRMSET- PRG Max. Starts/h P2-05 = 0 (0 ~ 25) "0" FWD	Max. Starts/h	N	Normally the amount of starts per hour is limited due to a possible thermal overloadin case compressors are started direct on line (DOL). This parameter prevents the 2nd compressor. "0" '= OFF
-MODE- DRV Rdy Countdown Rel. U7-04 = 0.5 sec U7-05 = 3.5 Std U7-06 = 9.5 Bar FWD	Countdown Timer for output relays	N	Once the conditions to switch the 2nd compressor ON or OFF are reached a down counter occurs in the display indicating the remaining time to switch ON or OFF in seconds.
-PRMSET- PRG Term M1-M2 H2-01 = 40 Verbund Schalt "0" FWD	Compound Mode for the digital Outputs	N	Once a digital output is foreseen to activate a further compressor the relevant output must be configured to "40/46/47". h2-01 --> M1/M2; h2-02 --> M3/M4;

L5.2 Example compound controller TCC - Mode



Compound controller with 2 compressor
Conditions: ACC Mode
Compressor 1 speed controlled
Compressor 2 speed controlled
Parameter:
P5-01 = 3 (TCC)
P5-02 = 30min Intervall time
h2-02 = 40 --> The output relay M1/M2 is configured to start and stop the 1st compressor.
h2-03 = 46 --> The output relay M3/M4 is configured to start and stop the 2nd compressor.
P2-01 = 58Hz; Once the output speed is above 58Hz, the timer in P2-02 starts.
P2-02 = 30s; Time to switch on the second compressor DOL
U7-04 = Shows the remaining time in seconds once timer P2-02 began to run.
P2-03 = 2,5 Bar; Once the pressure is below this value, the timer in P2-04 starts.
P2-04 = 10s; Time to switch OFF compressor running DOL

L5 Compound controller TCC mode

Modes for In- and Outputs R4

Modes digital inputs S3 to S8 (h1-01 - h1-08) R4.1

Modes: ▶	Description ▶	Function: ▶
03	Multi-step speed 1	The A1000 is running the motor with a fixed output frequency set in parameter d1-02 Default for input S5.
04	Multi-step speed 2	The A1000 is running the motor with a fixed output frequency set in parameter d1-03 Default for input S6.
05	Multi-step speed 3	The A1000 is running the motor with a fixed output frequency set in parameter d1-05
06	JOG-speed	The A1000 is running the motor with a fixed output frequency set in parameter d1-17. This frequency has got priority against other references.
08	Ext. base block n.o.	External base block (no), the drive output will be switched OFF once a signal occurs at a digital input. This will be indicated with a "bb" message in the display.
09	Ext. base block n.c.	External base block (nc), the drive output will be switched OFF once signal gets lost at a digital input. This will be indicated with a "bb" message in the display.
0F	Not used	This particular input is without function.
14	Fault RESET	On signal input the A1000 will be reset after it tripped, this mode is default for digital input S4. The cause for the trip must be fixed before reset will be activated.
15	Emergency-Stop	Signal input at a digital input with this mode will stop the motor with the ramp rate set in parameter C1-09.
19	PID-loop OFF	On signal input the A1000 will switch OFF the PID loop.
24	Ext. fault n.o.	On signal input the A1000 will tripp with fault message "EFX" (X=S**3** bis S**6**). It needs a reset signal to restart.
25	Ext. fault n.c.	Once signal gets lost at a digital input of the A1000 it will tripp with fault message "EFX" (X=S**3** bis S**6**). It needs a reset signal to restart.
2C	Ext. fault warning n.o.	On signal input the A1000 will indicate a warning message "EFX" (X=S**3** bis S**6**) on the display. It will continue to run.
2d	Ext. fault warning n.c.	Once signalgets lost at a digital input of the V1000 it will indicate a warning message "EFX" (X=S**3** bis S**8**) on the display.
35	PID-loop Invert	On signal the PID loop signal will be inverted.

Modes digital outputs 1 to 3 (h2-01 - h2-03) R4.2

00	During Run	Closed: A run command is active or voltage is at the output. Default for output 2 (P1) =h2-02.
01	Zero speed	Closed: Output frequeny is zero.
02	User set speed agree 1	Closed: Output speed equals the speed reference (plus or minus the hysteresis set in L4-02 (Band width).
06	V1000 is ready	Closed: Drive ready. The drive is powered up, not in a fault state and in DRIVE mode.
0C	Frequency reference loss	Closed: Loss of the analogue frequency reference detected. Enable when L4-05 = 1.
0E	Fault	Closed: Fault occured (other than CPF00 and CPF01)
10	Minor fault	Closed: An alarm is triggered.
20	oH pre alarm	Closed: Heatsink temperature exceeds parameter L8-02 value; Default: 95°C
37	During frequency output	Closed: Frequency is given to the output. Open: Operation stopped; baseblock; DC injection braking or initial excitation is performed.

Modes analogue input A2 (h3-10) R4.3

02	2. reference	Once one of digital inputs S3 to S7 is programmed in mode 3, analogue input A2 will be used as reference frequency (Standard A1).
0b	feedback for PID-loop	With this mode the analogue input A2 is used as a feedback source for the PID loop.

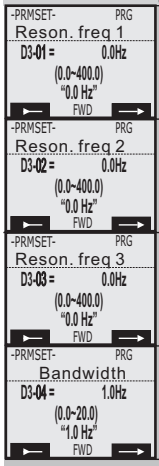
Modes analog outputs AM (h4-01) R4.4

01	Frequency refernence	Shows the actual frequency reference as a 0-10V signal, 10V = max.fFrequency.
02	Output frequency	Shows the actual output frequency as a 0-10V signa. 10V = max. frequency according to E1-04.
03	Output current	Shows the actual output current of the A1000. 10V = rated current of the A1000 Frequenzumrichters.
24	PID-feedback value	Shows the actual PID feedback signal. 10V = 100% feedback value.

This is only a selection from the Yaskawa manual YEG-SIEP C7 10606 27c of the screens mostly in use and does not demand any requirements for completeness.

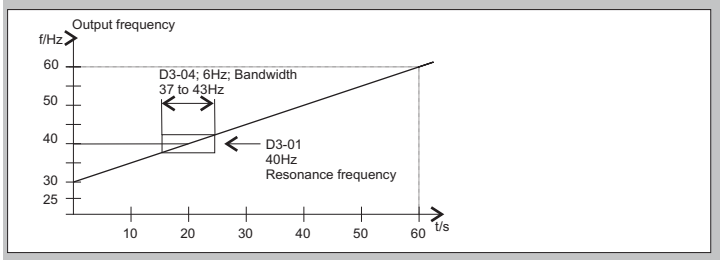
Modes for In- and Outputs R4

R5 Mostly used Standard-Parameter III



Resonance-frequency 1	N	In order to avoid continous operation at a speed that causes resonance in driven machinary, the A1000 can be programmed with 3 separate skip frequencies. This will not allow continued operation within specific frequency ranges. If the speed reference falls within a skip frequency dead band, the A1000 will clamp the frequency reference just below the dead band and only accelerate once the reference rises above the upper end of the dead band. The following conditions must be fullfilled: d3 - 01 > d3 - 02 > d3 -03
Resonance-frequency 2	N	
Resonance-frequency 3	N	
Bandwidth Resonance-frequency	N	Stellt die Bandbreite der Resonanz-frequenzen in Hz ein. Beispiel: Resonanzfrequenz = 20 Hz Bandbreite: 8 Hz. Die Frequenzen zwischen 16,0 und 24,0 Hz werden ausgeblendet.

R8.1 Example for a skip frequency



Oil-Reflow-, Crankcase Heater-function, Maintenance L6

Para-meter Number: ▶ Range min. ▼ max. ▼ Default Setting Value: ▶ Change during operation ▶ Parameter-description ▶

Oil-Reflow-function L4.1

Time oil reflow in seconds

Frequency Oil-Reflow in Hz

Once the A1000 is running with an output frequency which is below the value set in parameter P2-07 for the time set in parameter P2-06 the oil-reflow function will become active.
Caution: Once the oil-reflow is active the user must ensure that all refrigeration load will be switched on to avoid tripping due to low system pressure.

Oil-reflow running time in seconds

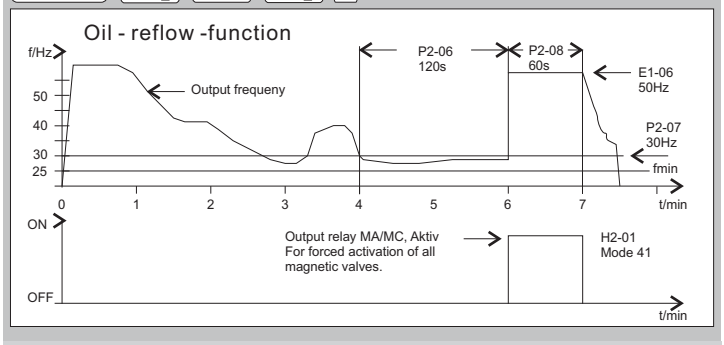
Once the oil reflow function is active the A1000 will accelerate the compressor to rated speed for the time set in this parameter.

Output relay MA/MC

Mode "41" for the output relay will be used to switch on all refrigeration load in the system while the oil-reflow mode is active.

Oil-Reflow at start

Once this function is active (Mode 1) the A1000 will run with rated speed for the time set in parameter P2-08 at every time it gets a start command.



Crankcase heater auto-mode L6.2

Caution: This function is only valid if the ambient temperatures of the A1000 and compressor are identical!

Temperature heater ON

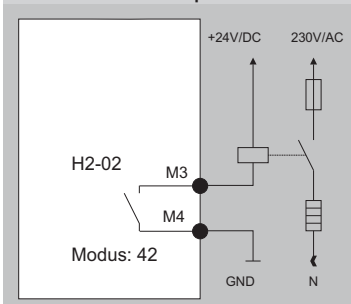
Interval to check temperature

Normally every time a standard compressor will be stopped the crankcase heater will be activated. The V1000 series can read the heatsink temperature, in this mode the drive will activate the crankcase heater individually once the temperature is below the setting in P3-01. Parameter P3-02 is used for the time to check the heatsink temperatur periodically. This will ensure that the heater will be active, only on demand.

Output relay MA/MB/MC

Mode "42" for the output relay MA/MC secures that the oil reflow function will become active through the output relay of the drive. Alternative Optocouplers: H2-02 Output P1; H2-03 Output P2

Example crankcase heating with output P2 L6.3



Specification:
Activate the crankcase heater once the ambient temperature is below 20°C.
Parameter:
P3-02 = 20,0°C (Temperature)
P3-03 = 30,0 Min (Sample rate)
h2-03 = 42 (Mode)
Function:
+ Once the ambient temperature is below 20°C the crankcase heater will activated at every standstill of the compressor.
+ The A1000 will be warmed up during operation. so the heatsink needs to cool down before measuring will start.
+ The setting of Parameter P3-02 to 30min. will ensure that the crankcase heater is ON for the first 30min, afterwards depending on the heatsink temperature the heater will be switched OFF if the temperature is still above 20°C. This will be checked every 30 minutes.

Caution: This function is only valid if the ambient temperature of A1000 and compressor is identical!
Because of the internal switch mode power supply of the A1000 the heatsink might be slightly warmer than the compressor.

Maintenance Counter

Determines the maintenance interval. Once the running time exceeds this value the following message appears in the display: "Calm3 Maintenance required".
Max.: 30000h; Default: 10000h

Remarks: The A1000 will not trip, only a warning will be displayed.
In case this happens the counter could be reset by setting a new value for e.g. 10000h.
The message / alarm will disappear.

L7.1 References via terminals

Para-meter Number: ▶ | Range min. ▼ max. ▼ | Default Setting Value: ▶ | Change during operation ┐ | Parameter-description ┐

Reference via terminals

P1-09	0	2	0	N

With short circuiting the terminals in accordance with the following chart the reference can be modified:
Mode: 0 Reference = P1-03;
1 Reference = A1; 2 Reference = terminals

YASKAWA A1000 series

SN S5 S6 S4

	R134a	R404	Pressure
	+16,0°C	-5,5°C	4,0 Bar
	+11,2°C	-10,0°C	3,3 Bar
	+5,0°C	-15,9°C	2,5 Bar
	+0,0°C	-20,7°C	1,9 Bar
	-5,0°C	-25,9°C	1,4 Bar
	-10,0°C	-30,0°C	1,0 Bar

Caution:
All settings are made for a pressure transducer with the following specifications:
Voltage range: 8-30V/DC; Signal: 4-20mA; Range: -0,8 to 7,0 Bar

Reference 3 via terminal S4

h1-04	0	9F	14	N

The wiring to set a reference via the digital inputs needs to be configured.
Input: S4 Mode 5 = Reference 3

Reference 1 via terminal S5

h1-05	0	9F	3	N

The wiring to set a reference via the digital inputs needs to be configured.
Input: S5 Mode 3 = Reference 1

Reference 2 via terminal S6

h1-06	0	9F	4	N

The wiring to set a reference via the digital inputs needs to be configured.
Input: S6 Mode 4 = Reference 2

L7.2 Low Pressure Bypass at Start

Low pressure off level at "Start"

P1-10	-50	50	15	Y

At every start of the compressor the low pressure switch OFF level will be reduced for the time set in parameter P1-11.

Low pressure time at "Start"

P1-11	0	300	0	N

Determines the time were the low pressure OFF level at start is active.
This function is not acive once the value will be set to "0" in the parameter.

L7.3 Behaviour on power ON

Behaviour on power ON

P1-12	0	3	3	N

Determines the reaction of the drive on power on of the A1000:
Mode 0:
Low pressure function not actice
Mode 1:
Start without delay
Mode 2:
Start with delayaccording to P1-07
Mode 3:
Start depending on the pressure at P1-04

L7.4 Display indication after Power ON

With standard LCD display

Remark:
Operation and Programming example at page L7

L7 Pressure reference via terminal

Mostly used Standard-Parameter II R2

Para-meter Number: ▶ | Range min. ▼ max. ▼ | Default Setting Value: ▶ | Change during operation ┐ | Parameter-description ┐

Motor nameplate frequency

E1-06	0	400	60	N

Motor nameplate voltage

E1-13	0	510	400	N

Rated motor frequency and voltage, is needed to adjust the V/Hz curve.
Example: 87Hz Operation:

Motor 230/400V; connected in Delta
E1-04 = 87Hz max. Output frequency
E1-05 = 400V max. Output voltage
E1-06 = 50Hz Base frequency (Nameplate)
E1-13 = 230V Motor rated voltage

Motor rated current

E2-01	0	999	0	N

With the input of the rated motor current the A1000 will calculate a thermal model of the connected motor to protect against over-heating. If the compressor would run too long at low speed, it will trip with fault "OL1."

Number of motor poles

E2-04	2	48	4	N

Determines the amount of motor poles and is used as basic data to calculate the auto-tuning function..

Motor nameplate power

E2-11	0	99.9	0	N

Determines the motor shaftpower and is used as a basic data for the calculation of the autotuning function. Default values may differ due to the size of the variable speed drive.

Modes digital inputs S1 to S6

h1-01	0	78	0	N

Modes digital inputs S1 to S6

h1-06	0	78	0	N

The mode of the digital inputs S1 - S7 is selectable according to table R6.1.
The default settings are:

S1 = Start forward command (h1-01)
S2 = Start reverse command (h1-02)
S3 = 24 External fault (h1-03)
S4 = 14 RESET (h1-04)
S5 = 03 Multifrequency 1 (h1-05)
S6 = 04 Multifrequebcy 2 (h1-06)

Modes digital outputs 1, 2, 3

h2-01	0	192	E	N

Modes digital outputs 1, 2, 3

h2-03	0	192	2	N

The digital outputs M1/M2, M3/M4, M5/M6 free selectable according to the table R4.2.
The default values are:
M1/M2 = "E"; Fault (h2-01)
M3/M4 = "0"; During RUN (h2-02)
M5/M6 = "2" Speed agree 1" (h2-03)

Gain analogue Input A1

h3-03	0	100	100	J

Sets the level of the analogue input A1 when 10V is input at terminal A1.
Parameter **H3-10** determines the gain on analogue input A2
Range: -999,9 to 999,9

Bias analogue Input A1

h3-04	0	100	0.0	J

Sets the level of the analogue input A1 when 0V is input at terminal A1.
Parameter **H3-11** determines the bias for analog ue input A2
Range: -999,9 to +999,9%

Modes for analogue Input A2

h3-10	0	31	b	N

This function determines the functions of analogue input A2 and can be selected with table R6.3.
Parameter H3-02 determines the functions for analogue input A1.

Function analogue Output AM

h4-01	1	31	b	N

The function of the 0-10V analogue output FM is depending on the settings in accordance with the monitor screens at page R5.
Range: 0 to 999.

Gain analogue output AM

h4-02	0	100	100	J

Determines the gain of the analogue output AM.
Range: -999,9 to 999,9%

Bias analogue ouput AM

h4-03	0	100	0	J

Determines the bias (Offset) of the analogue output AM.
Range: -999,9 to +999,9%

Power loss operation mode

L2-01	0	2	0	N

Determines the reaction of the A1000 on momentary power loss:
0 = Trips with fault: **Uv1** (Undervoltage)
1 = Re-start dependung on settings of **L2-02**
2 = Re-start as long CPU is active

Number of Autorest starts

L5-01	0	10	0	N

Determines how often the A1000 will automatically reset the drive after it tripped with fault and will try to start again.
.

Fault reset interval time

L5-04	0.5	600	10	J

Once the A1000 trips with acitve auotreset function (**L5-01**) this parameter will set the time to wait until the start shall happen.
The deley time for the re-start is given in seconds.

Function "STOP"-key

o2-02	0	1	1	N

Once the Start/Stop control is given through the terminals the STOP can be set as follows:
0 = STOP-key is disabled
1 = STOP-key is enabled.

Mode copy function

o3-01	0	3	0	N

This function has got the following modes:
0 = Normal operation
1 = READ from A1000 to Display
2 = WRITE from Display to A1000
3 = COMPARE

Activate copy function

o3-02	0	1	0	N

Before using the copy function it must be activated.
Mode 0 = Copy function not active
Mode 1 = Copy function is active

This is only a selection from the Yaskawa manual YEG-SIEP C7 10606 27c of the screens mostly in use and does not demand any requirements for completeness.

R3 Mostly used standard-parameter II

R1 Mostly used standard-parameter I

Para-meter Number: | Range min. max. | Default Setting Value: | Change during operation | Parameter-description

Language selection — A1-00 | 0 | 6 | 2 | N
Determines the language selection of the LCD-Display of the V1000.
0=English; 2=German; 3=French
4=Italian; 5=Spanish; 6=Portugese

Parameter access level — A1-01 | 0 | 2 | 2 | N
Determines parameter access for the user:
0 = Read only (Apart from A1-01; A1-04)
1 = Only user parameter A2-01 to A2-32
2 = Read and write access for all parameter.

Select control mode — A1-02 | 0 | 3 | 2 | N
Selects the motor control mode
0 = V/Hz control
2 = OLV Open loop vector control
5 = PM Open loop vector control

Initialization — A1-03 | 0 | 333 | 0 | N
Sets the A1000 back to default values:
0 = No Initialization
1110 = Init. User Parameter
2220 = Init. Default values (2-Wire)
3330 = Init. 3-wire Control

Reference source selection — b1-01 | 0 | 5 | 5 | N
Determines the reference source:
0 = Digital operator
1 = Analogue inputs via terminals
2 = Serial Communication
3 = Option PCB, **5 = CASE-Software**

RUN Command selection — b1-02 | 0 | 5 | 5 | N
Determines source for the RUN command:
0 = Digital Operator
1 = >Digital Inputs via terminals
2 = Serial Communication
3 = Option PCB; **5 = CASE-Software**

Stop-command selection — b1-03 | 0 | 3 | 1 | N
Determines the stopping method:
0 = Stop with rampe rate C1-01
1 = Spin Stop
2 = DC-Braking to stop
3 = Coast with timer

Reverse operation lock — b1-04 | 0 | 3 | 0 | N
Permits or prohibits reverse operation mode:
0 = Reverse mode enable
1 = Reverse mode disabled

PID-function setting — b5-01 | 0 | 3 | 1 | N
0 = PID disabled
1 = PID Active

Proportional gain setting — b5-02 | 0.0 | 25.0 | 3 | J
Sets the proportional gain of the PID loop.
Caution: A too high gain may cause un-stability in the system. A too low value may increase the PID error..

Integrationszeit — b5-03 | 0.0 | 360 | 2 | J
Sets the integral time of the PID loop.
Caution: A too short time may cause un-stability in the system. A too slow time may increase the PID error.

PID-Output level selection. — b5-09 | 0 | 1 | 1 | N
Sets the output direction:
0 = normal --> Decreasing feedback will increase output signal.
1 = Invers --> Increasing feedback will increase output signal.

Acceleration time in seconds — C1-01 | 0.0 | 600 | 3.0 | J
Determines the acceleration ramp rate after receipt of a start signal from 0Hz to max speed according to parameter E1-04; Default: 60Hz

Deceleration in seconds — C1-02 | 0.0 | 600 | 3.0 | J
Determines the deceleration ramp rate after receipt of a stop signal from max. frequency to 0Hz according to parameter E1-04; Default: 60Hz

Carrier frequency — C6-02 | 0 | F | 1 | N
Default values are depending on the size of the A1000:
0=Low carrier frequency mode
1=2,0kHz; 2=5kHz; 3=8,0kHz; 4=10,0kHz; 5=12,5kHz; 6=15,0kHz; F=Free programm.

Fixed speed D1-01 to D1-16 — d1-01 | 0 | 60.0 | 0.0 | J
There are up to 16 multi step frequencies which can be set via the terminals S3 to S6. D1-16 determines the frequency once the feedback pressure refence gets lost.
Default: 30 Hz.

Jog frequency reference — d1-17 | 0 | 60.0 | 6.0 | J
The JOG frequency has got priority against other frequency references.
Needs a digital input to be active parameter h1-XX in mode “6”.

Upper frequency limit — d2-01 | 0 | 110 | 100 | N
Sets the upper limit of the output frequency as a percentage of the max. output frequnecy according to E1-04.

Lower frequency limit — d2-02 | 0 | 110 | 50 | N
Sets the limit limit of the output frequency as a percentage of the max. output frequnecy according to E1-04.

Maximum output frequenz — E1-04 | 40 | 400 | 60.0 | N
Determines the max. output frequency of the connected motor.
The following conditions must be fullfilled:

E1-04 => E1-06 => E1-07 => E1-09

Max. ouput voltage — E1-05 | 0 | 510 | 400 | N
Determins the max. output voltage and is needed to adjust the V/Hz curve of the connected motor/Compressor.
See: E1-06 and E1-13

This is only a selection from the Yaskawa manual YEG-SIEP C7 10606 27c of the screens mostly in use and does not demand any requirements for completeness.

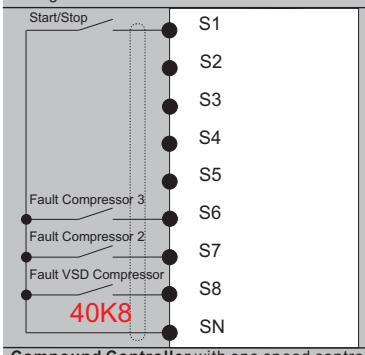
Compressor Feedback L8.1

In case several compressors are used in one rack, controlled by the A1000 it is possible to get a feedback from each individual compressor via the digital inputs. The A1000 will not activate any compressors which indicate a fault any more and pass on a message via digital output.

-PRMSET- PRG Select Term. S8 H1-08 = 83 FaultComp1 “8” FWD	Fault Compressor 1 running at the A1000	N	The input S8 will be used as a feedback from the speed controlled compresssor once parameter h1-08 is set to mode “83”. This unit will de-activated the compound controller keeps on working with the DOL units.Fault message via fault Relay.
-PRMSET- PRG Select Term. S7 H1-07 = 84 FaultComp2 “6” FWD	Fault Compound Compressor 2	N	The input S7 will be used as a feedback from compresssor no 2. once parameter h1-07 is set to mode “84”. This unit will de-activated the compound controller keeps on working with other DOL units. Fault message via fault Relay.
-PRMSET- PRG Select Term. S6 H1-06 = 85 FaultComp3 “4” FWD	Fault Compound Compressor 3	N	The input S6 will be used as a feedback from compresssor no 3. once parameter h1-06 is set to mode “85”. This unit will de-activated the compound controller keeps on working with other DOL units. Fault message via fault Relay.
-PRMSET- PRG Select Term.. S5 H1-05 = 86 FaultComp4 “3” FWD	Fault Compound Compressor 4	N	The input S5 will be used as a feedback from compresssor no 4. once parameter h1-06 is set to mode “86”. This unit will de-activated the compound controller keeps on working with other DOL units. Fault message via fault Relay.

Example: Compressor fault message L8.2

Compound controller with one speed controlled compressor and 2 units DOL (Direct on Line). Fault messages are failure-safe. This means that the inputs are active while the system is working failure free and not active in case of a fault. In every case the input signal must not have potential, just a relay contact. The direct connection of pressure switches is not recommended as these contacts are normally not designed to be used with control voltages.



Start/Stop frequency inverter A1000 via digital input S1

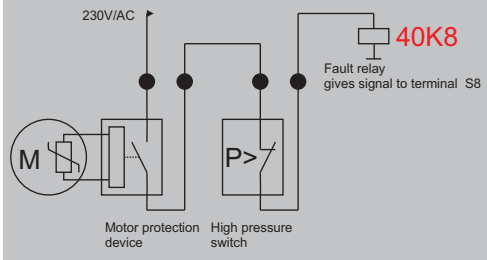
Fault message of compound compressor 3 via digital input S6

Fault message of compound compressor 2 via digital input S7

Fault message of the speed controlled compound compressor 1 digital input S8

Compound Controller with one speed controlled compressor and 2 compressors switched ON and OFF by the A1000 via contactor. Every compressor has got an internal motor protection device and a high pressure switch. The fault message will be activated via a relay contact o the digital input.

Example: Wiring for a fault message circuit of compressor no 1.



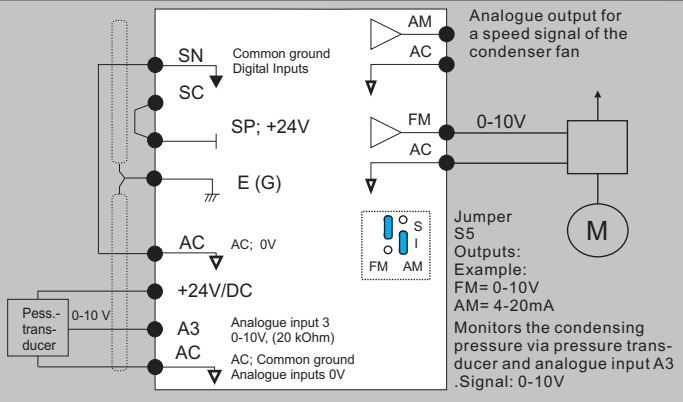
Parameter:
h1-08 =83 Terminal S8 (Fault speed controlled compressor)
h1-07 =84 Terminal S7 (Fault compressor 1)
h1-06 =85 Terminal S6 (Fault compressor 2)
Function:
+ Only in case all 3 inputs (S6, S7 and S8) are active, all 3 compressors will controlled by the A1000.
+ Once one input is not active, the A1000 recognizes this particular compressor due to the fault condition at the digital input.
+ Error message “CMPd (Compressor Fault) occurs on the display.
+ If one of these inputs is programmed in mode 83 to 86, this input must get a signal.
+ In case the fault status disappears the A1000 starts again to use this compressor in the compound circuit.

L9.1 Speed control of the condensing fan 0-10V

In case a pressure transducer is giving feedback signal of the condensing pressure through analogue input A3 (0-10V) , an internal PI controller creates an 0-10V signal to controll the speed of a condenser fan via the 0-10V t the FM output.Only if the fan is capable to work with a 0-10V reference signal.(e.g.: EC-fan).

-PRMSET- PRG Cond.Min. Press P6-01 = 0.0 Bar (-100.0~100.0) "0.0 Bar" FWD	Lower level Sensor Condensing Unit	N	The condensing pressure will be meausured through the analogue input A3, it must be a 0-10V signal.The parameter P6-01 and P6-02 determine the range of the pressure transducer. These settings are the reference to show the system pressure in real values on the display. Additionally they are the basis for an internal PI controller to create a 0-10 (4-20mA) signal for the condenser fan via the analogue output FM.
-PRMSET- PRG Cond.Max. Press P6-02 = 30.0 Bar (-100.0~100.0) "30.0 Bar" FWD	Upper level Sensor Condensing Unit	N	
-PRMSET- PRG Cond.Ref. Press P6-03 = 12.0 Bar (-100.0~100.0) "12.0 Bar" FWD	Reference Pressure Condenser	Y	Determines the condensing pressure during operation.An internal PI controller compares feedback value (Analogue input A3; 0-10V) with this setting and calculates an output signal, based on reference,feedback value and deviation.
-PRMSET- PRG P-Gain P6-04 = 5.0 (0.0~50.0) "5.0" FWD	P-Gain Condenser	Y	Sets the proportional gain of the PI loop for the speed signal of the condensing fan. **Caution:** A too high gain may cause unstability in the system. A too low value may increase the PI deviation.
-PRMSET- PRG I-Time P6-05 = 5.0sec (0.0~50.0) "5.0sec" FWD	I-Time Condenser	Y	Sets the integration time of the PI loop for the speed signal of the condensing fan. **Caution:** A too short time may cause unstability in the system. A too high time will increase the PI deviation.
-PRMSET- PRG Level Cond.OFF P6-12 = 5.0bar (-50.0~50.0) "5.0bar" FWD	OFF level Condensing Pressure	Y	In case the condensing pressure is below the level set in parameter P6-12 the A1000 will switch off the condensing fan. Once the condensing pressure exceeds again the pressure hysteresis in parameter P6-13 the A1000 will automatically switch on again; Example.: 5Bar (P6-12)+5Bar (P6-13)=10,0 Bar. At a value of 10.0 Bar the A1000 will activate the condenser fan again.
-PRMSET- PRG Level Kond.hys P6-13 = 5.0bar (0.0~50.0) "5.0bar" FWD	ON level Condensing Pressure (Hysteresis)	N	
-PRMSET- PRG KI A3 Funct Sel H3-06 = 22 Additional Ref 1 "2" FWD	Function Analogue-input A3	N	The A1000 is capable to measure the condensing pressure via the analogue input A3. This enables the A1000 to watch the condensing pressure and reduce the outpt power in case the pressure gets too or control the condensing fan via 0-10V
-PRMSET- PRG KI FM Funct Sel H4-01 = 707 Fan Volt. "102" FWD	Function Analogue-output FM	N	A 0-10V output signal can be used to control the speed of a condenser fan, if the fan can operate with a 0-10V signal.
-MONITR- DRV Rdy Kond. Druck U7-06 = 9.5 Bar U7-07 = 0.0% U7-08 = 0h FWD	Monitor Condensing Pressure	N	Shows the actual condensing pressure in the system.

L9.2 Wiring Example condenser control



Speed controll of a condensing unit; R134A; 10,0 Bar pressure.
Sensor 2: Transducer 0,0 Bar to 18 Bar connected at A3 (Condenser pressure)
P6-01 = 0,0 Bar (Lower value pressure transducer, Cond. pressure)
P6-02 = 18,0 Bar (Upper value pressure transducer, Cond. pressure)
P6-03 = 10,0 Bar (Reference pressure condenser)
P6-05 = 5,0 (P-gain PI control)
P6-06 = 10s (I-time PI control)
Function:
+ Once the condensing pressure exceeds the value set in parameter P6-03, the PI controller will increase the output speed of the condensing fan via the analogue output FM and a 0-10V signal.

Remark: L14.1

The following check list does not require any damand for completeness. The commissioning expert is responsible to meeting the local norms and standards.

Proceedure: L14.2

+ Type: CIMR-
+ Serial number:
+ Fuse: A
+ Cable: mm²
+Voltage: V

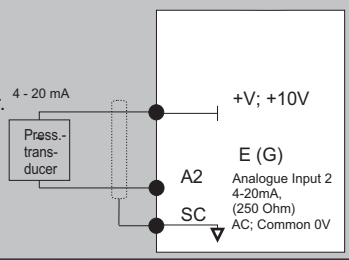
Prüfen des Verdichters: L14.3

+ Manufacturer:
+ Max. current:
+ Refrigerant: A
+ Evaporation temperature:
+ Suction pressure: °C
Bar

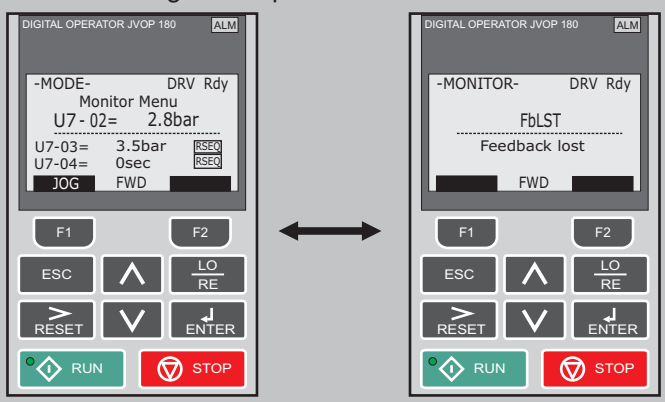
Check pressure transducer: L14.4

+ Manufacturer:
+ Type:
+ Range:
+ Connection:

Check connection of the pressure transducer. The transducer must be suitable for a supply voltage of von 10V/DC; 20mA.



Status message after .power ON: L14.5



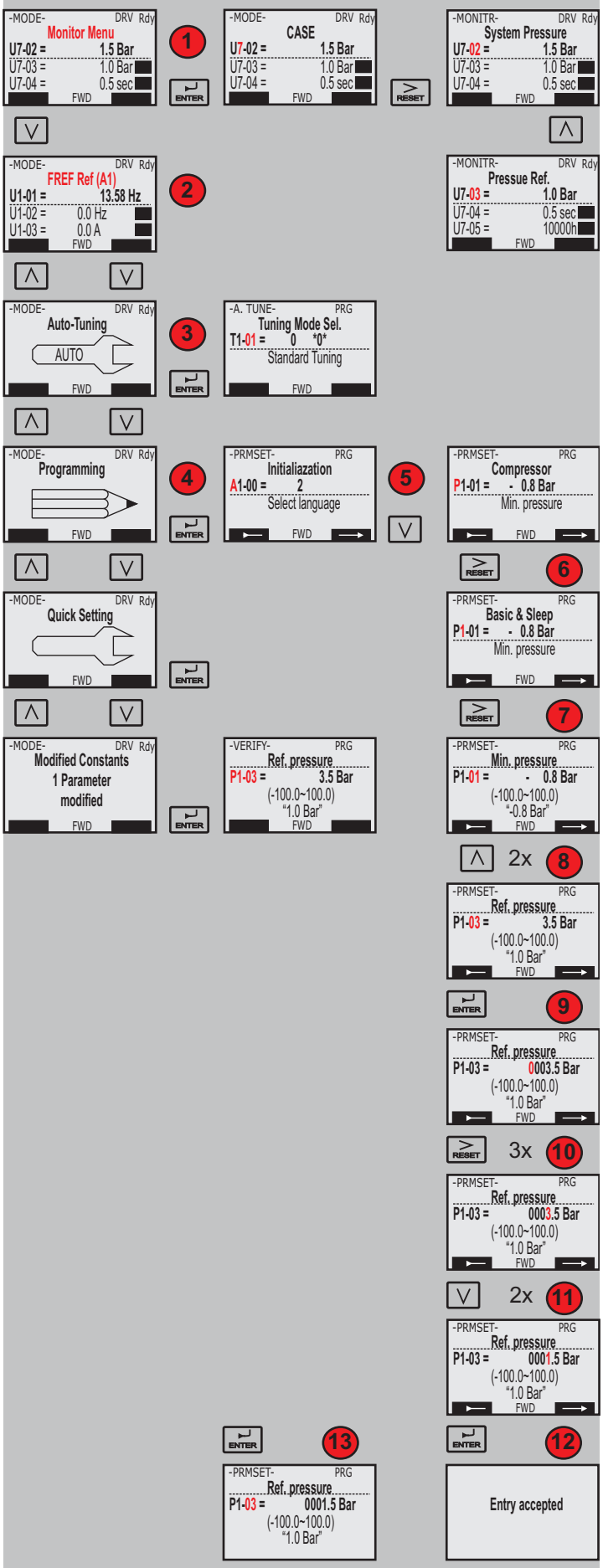
The actual suction pressure will be displayed after power ON, if settings and connections are in accordance with the manual.

In case the pressure transducer is not or wrong connected this message appears on the display.

L13 Programming example

Change the reference for the suction pressure in parameter P1-03 from 3,0Bar to 4,0 Bar

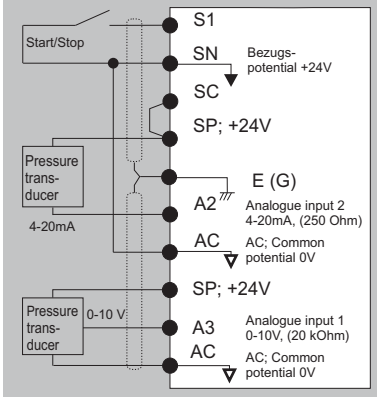
Press button until message in red characters will be displayed.:



Load reduction due to High Pressure L10.1

-PRMSET- PRG Cond.min.prssr P6-01 = 0.0 Bar (-100.0~100.0) "0.0 Bar" FWD	Lower level Sensor Condensing Pressure	N	The condensing pressure will be measured through the analogue input A3, it must be a 0-10V signal.The parameter P6-01 and P6-02 determine the range of the pressure transducer. These settings are the reference to measure the condensing pressure and in case it it exceeds a certain value this function can be used to reduce the output power to avoid HP tripping of the circuitry.
-PRMSET- PRG Kond.max.Druck P6-02 = 30.0 Bar (-100.0~100.0) "30.0 Bar" FWD	Upper level Sensor Condensing Pressure	N	
-PRMSET- PRG HP max. level P6-06 = 22.0 Bar (-100.0~100.0) "22.0 Bar" FWD	Load reduction; Pressure Level; 0=OFF	Y	Once the condensing pressure has exceeded the value in parameter P6-06 for the time set in parameter P6-07 the A1000 will automatically reduce the output frequency to lower the output power.
-PRMSET- PRG HP - Time P6-07 = 10 sec (0~500) "10 sec" FWD	Time for Load reduction	Y	
-PRMSET- PRG HD - Speed P6-08 = 0045.0Hz (30.0~60.0) "45.0Hz" FWD	Frequency Load reduction	Y	Determines the output frequency of the A1000 once the pressure has exceeded the value set in parameter P6-06 for the time set in parameter P6-07. Therefore it reduces the power and the condensing pressure returns to normal values.
-PRMSET- PRG HP recover level P6-09 = 16.0 Bar (-100.0~100.0) "16.0 Bar" FWD	High Pressure Recovey level	N	Once the condensing pressure returns to a level below the value set in P6-09 for the time in P6-10 the A1000 will return to normal conditions. Exp.: P6-06 = 20,0 Bar; P6-07 = 20s; P6-08= 45Hz; P6-09 = 16.0Bar; P6-10 = 10s. Load reduction sequence will be terminated in case the pressure will come down below 16.0Bar for 10s.
-PRMSET- PRG HP - Time 2 P6-10 = 30 sec (0~500) "30 sec" FWD	Time for ecovery	N	

Connection example: Load Reduction Circuit L10.2



Start/Stop Variable Speed Drive via Input S1

Determines the evaporation pressure via pressure transducer connected to analogue input A2
Signal: 4-20mA

Determines the condensing pressure via pressure transducer connected to analogue input A1
Signal: 0-10V

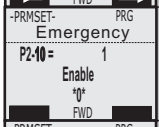
Compressor control with mit R134A; 1,0 Bar Evaporation pressure.
Load reduction at a condensing pressure of above 25.0Bar
Load reduction is finished once condensing pressure drops below 20.0Bar condensing pressure. Load reduction to 75% of nominal compressor power.
Settings:
Sensor1: Pressure transducer -0,8 Bar to 7.0 Bar at A2
(Evaporation pressure)
Sensor2: Pressure transducer 0,0 Bar to 30.0 Bar at A3
(Condensing pressure)
Parameter:
P1-01 = -0,8 Bar (Lower limit transducer, Evaporation pressure)
P1-02 = +7,0 Bar (Upper limit transducer, Evaporation pressure)
P1-03 = 1,0 Bar (Pressure reference)
P6-01 = 0,0 Bar (Lower limit transducer, Condensing pressure)
P6-02 = 30,0Bar (Upper limit transducer, Condensing pressure)
P6-06 = 25,0Bar (Pressure level to reduce load)
P6-07 = 20s (Min. 20s above 25,0 Bar to activate this function.)
P6-08 = 45Hz (Fixed speed to reduce load; fmax=60Hz)
P6-09 = 20,0Bar (Pressure to return to normal settings)

Function:
+ Once the condensing pressure exceeeds for min. 20 seconds a value of 25.0Bar, the output speed will be reduced, to lower output power.
+ The PID loop to control the evaporation pessure will be not active, output speed remains at 45Hz.
+ In case the condensing pressure falls below the value set in parameter P6-09 the PID loop to control the evaporation pressure gets active again.

- Description
- Parameter Number
- Range
- Default setting

Changable during RUN.
Values in "RED" differ from default.

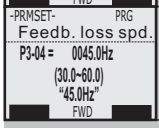
Parameter-Description



Notlaufmodus EIN

N

In case the speed controlled compressor trips during run, the A1000 may be capable to control the DOL compressors further, depending on the fault.
Mode 0: A1000 to trip; 1:Emergency active



Frequenz bei Signalverlust

N

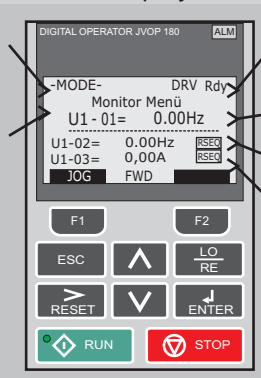
In case the pressure transducer to meausure is not connected or broken, the A1000 will change to a fixed speed set in this parameter. A message occurs: „Freq without FB".

Function of the LCD Text Display L12.1

Line 1
TOP LEFT "MONITR"
The V1000 is now in
Monitor mode.
Line 2
Parameter text description
Pressing keys

changes menus:

> FREF displays references
> Monitor menu
> Modified constants
> Quick start
> Programming
> Auto-Tuning



Line 1
TOP RIGHT Status:
Rdy = Ready
Line 3
Shows frequency reference
Line 5
Shows output frequeny
Line 6
Shows output current
Pressing **ENTER** key
gives access to the submenus:

> Monitoring menu
> Access to monitor display
> Access to modified constants
> Access to basic parameters
> Access to all parameters
> Access to Autotunig menu

RESET - Key
Moves cursor to the right, selects digit and is used as RESET-key.

ENTER - Key
Gives access to all submenus and confirms data input after pressing key.

ESC - Key
Returns to previous menu, before **ENTER** was pressed.

LOCAL/REMOTE - Key
Local: Bedienfeldsteuerung
Remote: Klemmensteuerung

Pressing **UP** - Key
or **DOWN** - key selects parameter and increases or decreases values

F1 and F2 - Key
Additional function keys with different functions.

RUN - Key
Starts the frequency inverter via display

STOP - Key
Stops the frequency inverter via display