**NOTE**

Please note that parameter 020 may block the choice of mode.

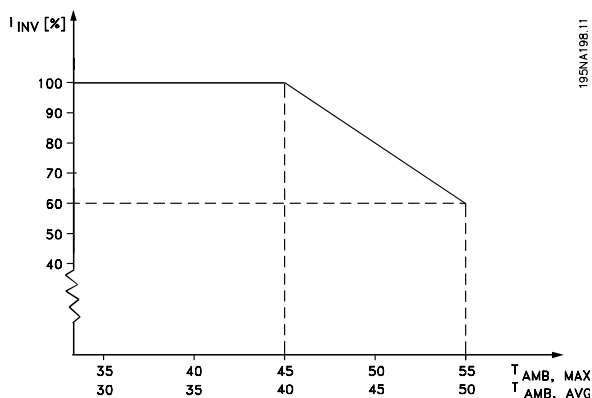
■ Warnings/alarms

Warnings or alarms appear in the LED display as a numerical code [Err. xx]. A warning is displayed until the fault has been corrected, while an alarm will flash until the [STOP/RESET] key is pressed. The table in *Warnings/alarms messages* in this manual explains the various warnings and alarms, and whether a fault locks the adjustable frequency drive. After a Trip locked fault, cut off the AC line supply and correct the fault. Then reconnect the AC line supply and press the [STOP/RESET] key. The adjustable frequency drive is now reset and ready. See *Warnings/alarms messages* in this manual for more detail.

■ Special conditions

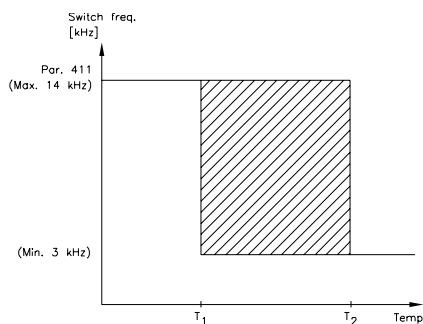
■ Derating for ambient temperature

The ambient temperature ($T_{AMB,MAX}$) is the maximum temperature allowed. The average ($T_{AMB,AVG}$) measured over 24 hours, must be at least 5 °C lower. If the frequency converter operates at temperatures above 45 °C, a derating of the rated output current is necessary.



■ Temperature-related switching frequency

This function ensures the highest possible switching frequency without the adjustable frequency drive becoming thermally overloaded. The internal temperature determines the switching frequency based on the load, the ambient temperature, the supply voltage and the cable length. The function ensures that the drive automatically adjusts the switching frequency between the minimum and maximum switching frequency (parameter 411), see drawing below.



When using the LC filter the minimum switch frequency is 4.5 kHz.

■ Derating for long motor cables

The adjustable frequency drive has been designed for a 240 ft (75 m) unscreened/unarmored cable or a 80 ft (25 m) screened/armored cable and a motor cable with a rated cross-section. If a cable with a larger cross-section is required, it is recommended to reduce the output current by 5% for each step that the cable cross-section is increased. (Increased cable cross-section leads to increased capacitance to ground, and thus to an increased ground leakage current.)

■ VLT 2800 start-up

Pre-installation checks

1. Compare drive model number to what was ordered.
2. Ensure each of following are rated for same voltage:
 - Drive
 - Power line
 - Motor
3. Record following motor data:
 - Voltage
 - Frequency
 - Full load current
 - Full load speed
 - Power - convert HP to kW (See conversion table in parameter 102, *Motor Power*, in this manual.)
4. Ensure that rated drive current is equal to or greater than total full load current.
 - Drive can be *at most* one size smaller than motor.
 - For multiple motor operations, add full load current ratings of all motors.
 - If drive rating is less than motor(s), full motor output cannot be achieved.
5. Check motor wiring:
 - Any disconnect between drive and motor should be interlocked to drive

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safety interlock circuit to avoid unwanted drive trips.

- No power factor correction capacitors can be connected between drive and motor.
- Two speed motors must be wired permanently for full speed.
- Y-start, Δ -run motors must be wired permanently for run.

Installation checks

1. Input fusing in power supply for all drives must be provided.
2. Environmental concerns - for standard NEMA 1 drive:
 - Clean air supply
 - Dry air (5% to 85% relative humidity, non-condensing)
 - 32°F (0°C) to 104°F (40°C) ambient temperature operating range, or as rated
 - 1000m (3,300 ft) maximum elevation with no derating
 - Keep any construction dirt out of drive.
3. Wiring
 - Wire drive in accordance with instructions and diagrams received with drive.
 - Separate conduits must be provided to drive for input power, output power, and control wiring.
 - Protect signal wires from noise.
 - Ground each drive individually.
 - Double check input and output power wiring for correct location.

Setting up drive for motor start

Ensure that all warnings provided in this manual have been adhered to. Apply power to the unit. Enter motor nameplate data into drive through Quick Menu.

1. Parameter 102, MOTOR POWER (in kW) (See conversion table in parameter 102, *Motor Power*, in this manual.)
2. Parameter 103, MOTOR VOLTAGE
3. Parameter 104, MOTOR FREQUENCY
4. Parameter 105, MOTOR CURRENT
5. Parameter 106, MOTOR SPEED
6. Parameter 107, select AUTOMATIC MOTOR TUNING

Operational tests - HAND

1. Check motor rotation from drive. If incorrect, disconnect input power from drive and reverse two leads between drive and motor.
2. Accelerate motor quickly to full speed and verify operation.
3. Decelerate motor quickly to stop and verify operation.
4. Operate motor over entire speed range while closely checking for resonance.

Operational tests - AUTO

1. Ensure that drive follows run/stop and safety interlock commands from system.
 2. Ensure drive follows speed reference, or feedback, from system.
-

■ Operation & Display

| 001 | Language | |
|------------|--------------------|-----|
| (language) | | |
| Value: | | |
| ★ | English (english) | [0] |
| | German (deutsch) | [1] |
| | French (français) | [2] |
| | Danish (dansk) | [3] |
| | Spanish (español) | [4] |
| | Italian (italiano) | [5] |

Function:

This parameter is used to choose the language to be shown in the display whenever the LCP control unit is connected.

Description of choice:

There is a choice of the languages shown. The factory setting may vary.

| 002 | Local/remote operation | |
|------------------|---------------------------|-----|
| (OPERATION SITE) | | |
| Value: | | |
| ★ | Remote operation (REMOTE) | [0] |
| | Local operation (LOCAL) | [1] |

Function:

There is a choice of two different modes of operation of the adjustable frequency drive; *Remote operation* [0] or *Local operation* [1]. See also parameter 013 *Local control* if *Local operation* [1] is selected.

Description of choice:

If *Remote operation* [0] is selected, the adjustable frequency drive is controlled via:

1. the control terminals or via serial communication.
2. the [START] key. This cannot, however, override stop commands transmitted via the digital inputs or via serial communication.
3. the [STOP/RESET] and [JOG] keys, on the condition that these are active.

If *Local operation* [1], is selected, the adjustable frequency drive is controlled via:

1. the [START] key. This cannot, however, override stop commands via the digital inputs (see parameter 013 *Local control*).
2. the [STOP/RESET] and [JOG] keys, on the condition that these are active.
3. the [FWD/REV] key, on the condition that it has been selected as active in parameter 016 *Local reversing*, and that parameter 013 *Local control* is set at *Local control and open loop* [1] or *Local control as parameter 100* [3]. Parameter 200 *Output frequency range* is set at *Both directions*.
4. parameter 003 *Local reference* where the reference can be set using the [+] and [-] keys.
5. an external control command that can be connected to the digital inputs (see parameter 013 *Local control*).



NOTE

The [JOG] and [FWD/REV] keys are located on the LCP control unit.

| 003 | Local reference | |
|--|-----------------|---------|
| (LOCAL REFERENCE) | | |
| Value: | | |
| Par. 013 <i>Local control</i> must be set to [1] or [2]: | | |
| 0 - f _{MAX} (par. 205) | | ★ 50 Hz |
| Par. 013 <i>Local control</i> must be set to [3] or [4]. | | |
| Ref _{MIN} - Ref _{MAX} (par. 204-205) | | ★ 0,0 |

Function:

In this parameter, the local reference can be set manually. The unit of the local reference depends on the configuration selected in parameter 100 *Configuration*.

Description of choice:

In order to protect the local reference, parameter 002 *Local/remote operation* must be set to *Local operation* [1]. Local reference cannot be set via serial communication.

★ = factory setting, () = display text, [] = value for use in communication via serial communication port

004 Active Setup (active Setup)

Value:

| | |
|-------------------------------|-----|
| Factory Setup (FACTORY SETUP) | [0] |
| ★ setup 1 (setup 1) | [1] |
| setup 2 (setup 2) | [2] |
| Setup 3 (setup 3) | [3] |
| setup 4 (setup 4) | [4] |
| Multi Setup (MULTI SETUP) | [5] |

Function:

The active parameter Setup is selected here. All parameters can be programmed in four individual parameter Setups. Shifts between Setups can be made in this parameter via a digital input or via serial communication.

Description of choice:

Factory Setup [0] contains the factory-set parameter values. *Setup 1-4* [1]-[4] are four individual Setups which can be selected as required. *Multi Setup* [5] is used where remote-controlled shifts between the four Setups via a digital input or via serial communication is required.

005 Programming Set-up (EDIT SET-UP)

Value:

| | |
|---------------------------------|-----|
| Factory Set-up (FACTORY SET-UP) | [0] |
| Set-up 1 (set-up 1) | [1] |
| Set-up 2 (set-up 2) | [2] |
| Set-up 3 (set-up 3) | [3] |
| Set-up 4 (set-up 4) | [4] |
| ★ Active Set-up (ACTIVE SET-UP) | [5] |

Function:

You can select the desired set-up to program during operation (this applies both via the control panel and the serial communication port). For example, it is possible to program *Set-up 2* [2] while the active set-up is set to *Set-up 1* [1] in parameter 004 *Active Set-up*.

Description of choice:

Factory Set-up [0] contains the factory-set data and can be used as a source of data if the other set-ups are to be reset to a known status. *Set-up 1-4* [1]-[4] consists of individual set-ups that can be programmed freely during operation. If *Active Set-up* [5] is selected, the programming set-up will be equal to parameter 004 *Active Set-up*.



NOTE

If data is modified or copied to the active set-up, the modifications have an immediate effect on the unit's operation.

006 Setup copying (SETUP COPY)

Value:

| | |
|--|-----|
| ★ No copying (NO COPY) | [0] |
| Copy to Setup 1 from # (COPY TO SETUP 1) | [1] |
| Copy to Setup 2 from # (COPY TO SETUP 2) | [2] |
| Copy to Setup 3 from # (COPY TO SETUP 3) | [3] |
| Copy to Setup 4 from # (COPY TO SETUP 4) | [4] |
| Copy to all Setups from # (copy to all) | [5] |

Function:

You can copy from the selected active Setup in parameter 005 *Programming setup* to the selected Setup or Setups in this parameter.



NOTE

Copying is only possible in Stop (motor stopped in connection with a stop command).

Description of choice:

Copying begins when the required copying function has been selected and the [OK]/[CHANGE DATA] key has been pushed. The display indicates when copying is in progress.

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007 LCP copy (LCP COPY)

Value:

- ★ No copying (NO COPY) [0]
- Upload all parameters (UPL. ALL PAR.) [1]
- Download all parameters (DWNL. ALL PAR.) [2]
- Download size-independent parameters
(DWNL.OUTPIND.PAR.) [3]

Function:

Parameter 007 *LCP copy* is used if you want to use the LCP 2 control panel's integral copy function. The function is used if you want to copy all parameter setups from one adjustable frequency drive to another by moving the LCP 2 control panel.

Description of choice:

Select *Upload all parameters* [1] if you want all parameter values to be transferred to the control panel. Select *Download all parameters* [2] if all parameter values transferred are to be copied to the adjustable frequency drive to which the control panel is attached. Select *Download size-independent par.* [3] if you only want to download the size-independent parameters. This is used when downloading to a adjustable frequency drive with a different rated power size than that from which the parameter setup originates.



NOTE

Upload/download can only be performed in stop mode. Download can only be performed to a adjustable frequency drive with the same software version number, see parameter 626 *Database identification no.*

008 Display scaling of output frequency (FREQUENCY SCALE)

Value:

0.01 - 100.00 ★ 1.00

Function:

In this parameter, the factor is selected by which the output frequency is to be multiplied. The value is shown in the display, provided parameters 009-012

Display readout have been set to *Output frequency x scaling* [5].

Description of choice:

Set the required scaling factor.

009 Large display readout (DISPLAY LINE 2)

Value:

- No readout (none) [0]
- Resulting reference [%]
(reference [%]) [1]
- Resulting reference [unit]
(reference [unit]) [2]
- Feedback [unit] (feedback [unit]) [3]
- ★ Frequency [Hz] (Frequency [Hz]) [4]
- Output frequency x scaling
(frequency x scale) [5]
- Motor current [A] (Motor current [A]) [6]
- Torque [%] (Torque [%]) [7]
- Power [kW] (Power [kW]) [8]
- Power [HP] (Power [HP][US]) [9]
- Motor voltage [V]
(Motor voltage [V]) [11]
- DC link voltage [V]
(DC link voltage [V]) [12]
- Thermal load motor [%]
(Motor thermal [%]) [13]
- Thermal load [%]
(FC. thermal[%]) [14]
- Running hours [Hours]
(RUNNING HOURS) [15]
- Digital input [Bin]
(Digital input[bin]) [16]
- Analog input 53 [V]
(analog input 53 [V]) [17]
- Analog input 60 [mA]
(analog input 60 [mA]) [19]
- Pulse reference [Hz]
(Pulse ref. [Hz]) [20]
- External reference [%]
(external ref. [%]) [21]
- Status word [Hex] (Status word [hex]) [22]

★ = factory setting, () = display text, [] = value for use in communication via serial communication port

| | |
|--|------|
| Heatsink temperature [°C] (Heatsink temp [°C]) | [25] |
| Alarm word [Hex] (Alarm word [hex]) | [26] |
| Control word [Hex] (Control word [Hex]) | [27] |
| Warning word [Hex] (warning word [Hex]) | [28] |
| Extended status word [Hex] (Ext. status [hex]) | [29] |
| Communication option card warning (COMM OPT WARN [HEX]) | [30] |
| Pulse count (PULSE COUNTER) | [31] |

Function:

In this parameter you can select the data value that you wish to display in the LCP 2 control unit display line 2 when the adjustable frequency drive is switched on. The display will also be included in the scrollbar in display mode. In parameters 010-012 *Display readout* you can select a further three data values, which are displayed in display line 1.

Description of choice:

No readout can only be selected in parameters 010-012 *Small display readout*.

Resulting reference [%] gives, as a percentage, the resulting reference in the range from Minimum reference, Ref_{MIN} to Maximum reference, Ref_{MAX}.

Reference [unit] gives the resulting reference with unit Hz in *Open loop*. In *Closed loop* the reference unit is selected in parameter 416 *Process units*.

Feedback [unit] gives the resulting signal value using the unit/scaling selected in parameter 414 *Minimum feedback, FB_{LOW}*, 415 *Maximum feedback, FB_{HIGH}* and 416 *Process units*.

Frequency [Hz] gives the output frequency of the adjustable frequency drive.

Output frequency x scaling [-] equals the present output frequency f_M multiplied by the factor set in parameter 008 *Display scaling of output frequency*.

Motor current [A] gives the phase current of the motor measured as an effective value.

Torque [%] denotes the motor's present load in relation to the motor's rated torque.

Power [kW] gives the present power that the motor is absorbing in kW.

Power [HP] gives the present power that the motor is absorbing in HP.

Motor voltage[V] gives the voltage supplied to the motor.

DC link voltage [V] gives the intermediate circuit voltage of the adjustable frequency drive.

Thermal load motor [%] gives the calculated/estimated load on the motor. 100 % is the cut-out limit.

Thermal load [%] gives the calculated/estimated thermal load on the adjustable frequency drive. 100 % is the cut-out limit.

Running hours [Hours] gives the number of hours that the motor has run since the last reset in parameter 619 *Reset of running hours counter*.

Digital input [Binary code] gives the signal status from the 5 digital inputs (18, 19, 27, 29 and 33). Terminal 18 corresponds to the bit on the extreme left. '0' = no signal, '1' = signal connected.

Analog input 53 [V] gives the voltage value of terminal 53.

Analog input 60 [mA] gives the present value of terminal 60.

Pulse reference [Hz] gives the reference in Hz connected to terminal 33.

External reference [%] gives the sum of external references as a percentage (sum of analogue/pulse/serial communication) in the range from Minimum reference, Ref_{MIN} to Maximum reference, Ref_{MAX}.

Status word [Hex] gives one or several status conditions in a Hex code. See *Serial communication* in the *VLT 2800 Design Guide* for further information.

Heatsink temp.[°C] gives the present heatsink temperature of the adjustable frequency drive. The cut-out limit is 90-100°C, while cutting back in occurs at 70 ± 5°C.

Alarm word [Hex] gives one or several alarms in hex code. See *Serial communication* in the *VLT 2800 Design Guide* for further information.

Control word [Hex] gives the control word for the adjustable frequency drive. See *Serial communication* in the *VLT 2800 Design Guide* for further information.

★ = factory setting, () = display text, [] = value for use in communication via serial communication port

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Warning word [Hex] gives one or several warnings in hex code. See *Serial communication* in the *VLT 2800 Design Guide* for further information.

Extended status word [Hex] gives one or several status modes in Hex code. See *Serial communication* in the *VLT 2800 Design Guide* for further information.

Communication option card warning [Hex] gives a warning word if there is a fault in the communication bus. Only active if communication options are installed.

If there are no communication options 0 Hex is displayed.

Pulse count gives the number of pulses that the unit has registered.

010 Small display line 1.1 (DISPLAY LINE 1.1)

Value:

See par. 009 *Large display* ★ Analog input 53
readout [V] [17]

Function:

In this parameter, the first of three data values can be selected that is to be displayed in the LCP control unit display, line 1, position 1. This is a useful function, e.g. when setting the PID regulator, as it gives a view of process reactions to reference changes. The display readout is activated by pushing the [DISPLAY STATUS] key.

Description of choice:

See parameter 009 *Large display readout*.

011 Small display readout 1.2 (DISPLAY LINE 1.2)

Value:

See parameter 009 *Large display* ★ Motor cur-
readout [A][6]

Function:

See the functional description given under parameter 010 *Small display readout*.

Description of choice:

See parameter 009 *Large display readout*.

012 Small display readout 1.3 (DISPLAY LINE 1.3)

Value:

See parameter 009 *Large display* ★ Feedback
readout [unit] [3]

Function:

See the functional description given under parameter 010 *Small display readout*.

Description of choice:

See parameter 009 *Large display readout*.

013 Local control (LOC CTRL/CONFIG.)

Value:

- Local not active (DISABLE) [0]
- Local control and open loop without slip compensation (LOC CTRL/OPEN LOOP) [1]
- Remote-operated control and open loop without slip compensation (LOC+DIG CTRL) [2]
- Local control as parameter 100 (LOC CTRL/AS P100) [3]
- ★ Remote-operated control as parameter 100 (LOC+DIG CTRL/AS P100) [4]

Function:

This is where the required function is selected if, in parameter 002 *Local/remote operation*, *Local operation* [1] has been chosen.

Description of choice:

If *Local not active* [0] is selected, it is not possible to set a reference via parameter 003 *Local reference*. In order to enable a shift to *Local not active* [0], parameter 002 *Local/remote operation* must be set to *Remote operation* [0].

Local control and open loop [1] is used if the motor speed is to be set via parameter 003 *Local reference*. When this choice is made, parameter 100 *Configuration* automatically shifts to *Speed regulation, open loop* [0].

Remote-operated control and open loop [2] functions in the same way as *Local control and open loop* [1];

★ = factory setting, () = display text, [] = value for use in communication via serial communication port

however, the adjustable frequency drive can also be controlled via the digital inputs.

For selections [1-2] control is shifted to open loop, no slip compensation.

Local control as parameter 100 [3] is used when the motor speed is to be set via parameter 003 *Local reference*, but **without** parameter 100 *Configuration* automatically shifting to *Speed regulation, open loop* [0].

Remote-operated control as parameter 100 [4] works the same way as *Local control as parameter 100* [3]; however, the adjustable frequency drive can also be controlled via the digital inputs.

Shifting from *Remote operation* to *Local operation* in parameter 002 *Local/remote operation*, while this parameter has been set to *Remote-operated control and open loop* [1]: The present motor frequency and direction of rotation will be maintained. If the present direction of rotation does not respond to the reversing signal (negative reference), the reference will be set to 0.

Shifting from *Local operation* to *Remote operation* in parameter 002 *Local/remote control*, while this parameter has been set to *Remote-operated control and open loop* [1]: The configuration selected in parameter 100 *Configuration* will be active. The shift will be smooth.

Shifting from *Remote control* to *Local control* in parameter 002 *Local/remote operation*, while this parameter has been set to *Remote-operated control as parameter 100* [4]: the present reference will be maintained. If the reference signal is negative, the local reference will be set to 0.

Shifting from *Local operation* to *Remote operation* in parameter 002 *Local/remote operation*, while this parameter has been set to *Remote operation*: The local reference will be replaced by the remote-operated reference signal.

| 014 | Local stop |
|--------------|--------------------------|
| (LOCAL STOP) | |
| Value: | |
| | Not active (DISABLE) [0] |
| ★ | Active (ENABLE) [1] |

Function:

In this parameter, the local [STOP]-key can be engaged or disengaged on the control panel and on the LCP control panel.

Description of choice:

If *Not active* [0] is selected in this parameter, the [STOP]-key will be inactive.



NOTE

If *Not active* [0] is selected, the motor cannot be stopped by means of the [STOP]-key.

| 015 | Local jog |
|-----------------|--------------------------|
| (LOCAL JOGGING) | |
| Value: | |
| ★ | Not active (DISABLE) [0] |
| | Active (ENABLE) [1] |

Function:

In this parameter, the jog function on the LCP control panel can be engaged/disengaged.

Description of choice:

If *Not active* [0] is selected in this parameter, the [JOG]-key will be inactive.

| 016 | Local reverse |
|-----------------|--------------------------|
| (LOCAL REVERSE) | |
| Value: | |
| ★ | Not active (DISABLE) [0] |
| | Active (ENABLE) [1] |

Function:

In this parameter you can select/deselect the reverse function on the LCP control panel. The key can only be used if parameter 002 *Local/remote operation* is set to *Local operation* [1] and parameter 013 *Local control to Local control, open loop* [1] or *Local control as parameter 100* [3].

★ = factory setting, () = display text, [] = value for use in communication via serial communication port

Description of choice:

If *Disable* [0] is selected in this parameter, the [FWD/REV] key will be disabled. See also parameter 200 *Output frequency range*.

017 Local reset of trip
(LOCAL RESET)
Value:

- Not active (DISABLE) [0]
- ★ Active (ENABLE) [1]

Function:

In this parameter, the reset function on the control panel can be engaged/disengaged.

Description of choice:

If *Not active* [0] is selected in this parameter, the reset function will be inactive.


NOTE

Select *Not active* [0], only if an external reset signal has been connected via the digital inputs.

018 Lock for data changes
(DATA CHANGE LOCK)
Value:

- ★ Not locked (NOT LOCKED) [0]
- Locked (LOCKED) [1]

Function:

In this parameter, it is possible to 'lock' the controls to disable data changes via the control keys.

Description of choice:

If *Locked* [1] is selected, data changes in the parameters cannot be made; however, it will still be possible to make data changes via serial communication. Parameter 009-012 *Display readout* can be changed via the control panel.

019 Operating mode at power-up, local operation
(POWER UP ACTION)
Value:

- Auto restart, use saved reference (AUTO RESTART) [0]
- ★ Forced stop, use saved reference (LOCAL=STOP) [1]
- Forced stop, set ref. to 0 (LOCAL=STOP, REF=0) [2]

Function:

Setting of the required operating mode when the mains voltage is engaged. This function can only be active if *Local operation* [1] has been selected in parameter 002 *Local/remote operation*.

Description of choice:

Auto restart, use saved ref. [0] is selected if the adjustable frequency drive is to start using the local reference (set in parameter 003 *Local reference*) and the start/stop state given via the control keys immediately prior to the mains voltage being cut out.

Forced stop, use saved ref. [1] is selected if the adjustable frequency drive is to remain stopped when the mains voltage is engaged, until the [START]-key is activated. After a start command the motor speed is ramped up to the saved reference in parameter 003 *Local reference*.

Forced stop, set ref. to 0 [2] is selected if the adjustable frequency drive is to remain stopped when the mains voltage is cut back in. Parameter 003 *Local reference* is to be zeroed.


NOTE

In remote operation (parameter 002 *Local/remote operation*) the start/stop state at the time of mains connection will depend on the external control signals. If *Pulse start* [8] is selected in parameter 302 *Digital input*, the motor will remain stopped after mains connection.

★ = factory setting, () = display text, [] = value for use in communication via serial communication port

| | |
|-------------------------|-----------------------|
| 020 | Hand operation |
| (HAND OPERATION) | |
| Value: | |
| ★ Not active (DISABLE) | [0] |
| Active (ENABLE) | [1] |

Function:
 In this parameter you can select whether it should be possible or not to switch between Auto- and Hand mode. In Auto mode the adjustable frequency drive is controlled by external signals whereas the adjustable frequency drive in Hand mode is controlled via a local reference directly from the control unit.

Description of choice:
 If *Not active* [0] is selected in this parameter, the Hand mode function will be inactive. If *Active* [1] is selected you can switch between Auto- and Hand mode. For further information, see the *Control Unit* section.

| | |
|-------------------------|-------------------------------|
| 024 | Userdefined Quick Menu |
| (user quickmenu) | |
| Value: | |
| ★ Not active (Disable) | [0] |
| Active (Enable) | [1] |

Function:
 In this parameter you can select the standard setup of the Quick menu key on the control panel and the LCP 2 control panel. Using this function, in parameter 025 *Quick Menu setup* the user can select up to 20 parameters for the Quick Menu key.

Description of choice:
 If *not active* [0] is selected, the standard setup of the Quick Menu key is active.
 If *Active* [1] is selected, the user-defined Quick Menu is active.

| | |
|-------------------------------|-------------------------|
| 025 | Quick Menu setup |
| (Quick Menu setup) | |
| Value: | |
| [Index 1 - 20] Value: 0 - 999 | ★ 000 |

Function:
 In this parameter you define which parameters are required in the Quick Menu when parameter 024 *User-defined Quick Menu* is set to *Active* [1].
 Up to 20 parameters can be selected for the user-defined Quick Menu.



NOTE
 Please note that this parameter can only be set using an LCP 2 control panel. See *Order form*.

Description of choice:
 The Quick Menu is set up as follows:

1. Select parameter 025 *Quick Menu setup* and press [CHANGE DATA].
2. Index 1 indicates the first parameter in Quick Menu. You can scroll between the index numbers using the [+ / -] keys. Select Index 1.
3. Using [< >] you can scroll between the three figures. Press the [<] key once and the last number in the parameter number can be selected using the [+ / -] keys. Set Index 1 to 100 for parameter 100 *Configuration*.
4. Press [OK] when Index 1 has been set to 100.
5. Repeat steps 2 - 4 until all parameters required have been set to the Quick Menu key.
6. Press [OK] to complete the Quick Menu setup.

If parameter 100 *Configuration* is selected at Index 1, Quick Menu will start with this parameter every time Quick Menu is activated.

Please note that parameter 024 *User-defined Quick Menu* and parameter 025 *Quick Menu setup* are reset to the factory setting during initialisation.

★ = factory setting, () = display text, [] = value for use in communication via serial communication port

■ Load and Motor

100 Configuration
(Configuration)

Value:

| | |
|---|-----|
| ★ Speed control, open-loop (SPEED OPEN-LOOP) | [0] |
| Speed control, closed-loop (SPEED CLOSED-LOOP) | [1] |
| Process control, closed-loop (PROCESS CLOSED-LOOP) | [3] |

Function:

This parameter is used to select the configuration to which the adjustable frequency drive is to be adapted. This makes adaptation to a given application simple, since the parameters not used in a given configuration are hidden (not active).

Description of choice:

If *Speed control, open-loop* [0] is selected, normal speed control is obtained (without feedback signal) with automatic load and slip compensation to ensure a constant speed at varying loads. Compensations are active, but may be disabled in parameter 134 *Load compensation* and parameter 136 *Slip compensation* as required.

If *Speed control, closed-loop* [1] is selected, better speed accuracy is obtained. A feedback signal must be added, and the PID regulator must be set in parameter group 400 *Special functions*.

If *Process control, closed-loop* [3] is selected, the internal process regulator is activated to enable precise control of a process in relation to a given process signal. The process signal can be set to the relevant process unit or as a percentage. A feedback signal must be added from the process, and the process regulator must be set in parameter group 400 *Special functions*. Process closed-loop is not active if a DeviceNet card is mounted and Instance 20/70 or 21/71 is chosen in parameter 904 *Instance types*.

101 Torque characteristic
(TORQUE CHARACT)

Value:

| | |
|---|-----|
| ★ Constant torque (Constant torque) | [1] |
| Variable torque low (torque: low) | [2] |
| Variable torque medium (torque: med) | [3] |
| Variable torque high (torque: high) | [4] |
| Variable torque low with CT start (VT LOW CT START) | [5] |
| Variable torque medium with CT start (VT MED CT START) | [6] |
| Variable torque high with CT start (VT HIGH CT START) | [7] |
| Special motor mode (Special motor mode) | [8] |

CT = Constant torque

Function:

This parameter enables a choice of principle for adaptation of the U/f ratio of the variable frequency drive to the torque characteristic of the load. See par. 135 *U/f ratio*.

Description of choice:

If *Constant torque* [1] is selected, a load-dependent U/f characteristic is obtained, in which output voltage and output frequency are increased at increasing loads in order to maintain constant magnetization of the motor.

Select *Variable torque low* [2], *Variable torque medium* [3] or *Variable torque high* [4], if the load is square (centrifugal pumps, fans).

Variable torque - low with CT start [5], *- medium with CT start* [6] or *high with CT start* [7], are selected if you need a greater breakaway torque than can be achieved with the three first characteristics.

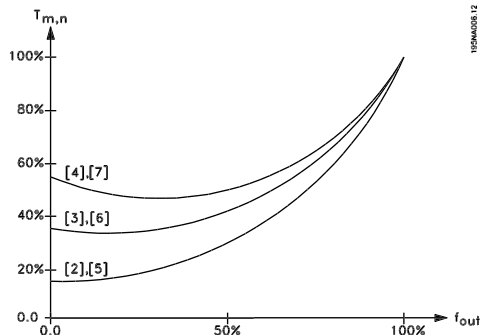


NOTE

Load and slip compensation are not active if variable torque or special motor mode have been selected.

★ = factory setting, () = display text, [] = value for use in communication via serial communication port

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Select *Special motor mode* [8], if a special U/f setting is needed that is to be adapted to the present motor. The break points are set in parameters 423-428 *Voltage/frequency*.



NOTE

If a value set in the name-plate parameters 102-106 is changed, parameters 108 *Stator resistance* and 109 *Stator reactance* change automatically. Enter motor name plate data in sequence from parameter 102 to 106. The relationship between values are interdependent.

102 Motor power $P_{M,N}$

(motor power)

Value:

0.25 - 22 kW ☆ Depends on unit

Function:

Here you must set a power value [kW] $P_{M,N}$, corresponding to the motor's rated power.

Description of choice:

Set a value that matches the nameplate data on the motor. Settings between one size below and one size over the factory setting are possible.

| North American HP to kW Conversion Chart | |
|--|------|
| HP | kW |
| 1/2 | 0.37 |
| 3/4 | 0.55 |
| 1 | 0.75 |
| 1 1/2 | 1.1 |
| 2 | 1.5 |
| 3 | 2.2 |
| 4 | 3.0 |
| 5 | 4 |
| 7 1/2 | 5.5 |
| 10 | 7.5 |

103 Motor voltage $U_{M,N}$

(MOTOR VOLTAGE)

Value:

For 200 V units: 50 - 999 V ☆ 230 V
For 400 V units: 50 - 999 V ☆ 400 V

Function:

This is where to set the rated motor voltage.

Description of choice:

Select a value that corresponds to the nameplate data on the motor, regardless of the adjustable frequency drive's AC line voltage.

104 Motor frequency $f_{M,N}$

(MOTOR FREQUENCY)

Value:

24-1000 Hz ☆ 50 Hz

Function:

This is where to select the rated motor frequency $f_{M,N}$.

Description of choice:

Select a value that corresponds to the nameplate data on the motor.

105 Motor current $I_{M,N}$

(MOTOR CURRENT)

Value:

0,01 - I_{MAX} ☆ Depends on choice of motor

☆ = factory setting, () = display text, [] = value for use in communication via serial communication port

Function:

The nominal, rated current of the motor $I_{M,N}$ forms part of the variable frequency drive calculation of features such as torque and motor thermal protection.

Description of choice:

Set a value that corresponds to the nameplate data on the motor. Set the motor current $I_{M,N}$ taking into account whether the motor is star-connected Y or delta-connected Δ .

106 Rated motor speed (MOTOR NOM. SPEED)

Value:

100 - $f_{M,N} \times 60$
(max. 60000) ☆ Depends on parameter 104 *Motor frequency, $f_{M,N}$*

Function:

This is where to set the value that corresponds to the rated motor speed $n_{M,N}$ that can be seen from the nameplate data.

Description of choice:

Select a value that corresponds to the nameplate data on the motor.



NOTE

The max. value equals $f_{M,N} \times 60$. $f_{M,N}$ to be set in parameter 104 *Motor frequency, $f_{M,N}$* .

107 Automatic motor tuning, AMT (auto motor tun.)

Value:

☆ Optimisation off (AMT off) [0]
Optimisation on (AMT start) [2]

Function:



NOTE

AMT is not possible on VLT 2880-82.

- For AMT to define the motor parameters accurately, the correct nameplate data for the motor connected to the adjustable frequency drive must be keyed into parameters 102 to 106.
- Alarms will appear in the display if faults arise during tuning of the motor. See *Warnings/alarms messages* in this manual.
- As a rule, the AMT function can measure the R_S values for motors that are 1-2 sizes larger or smaller than the adjustable frequency drive's nominal size.
- If you wish to interrupt automatic motor tuning, press the [STOP/RESET] key.



NOTE

AMT may not be performed on motors connected in parallel, nor may setup changes be made while AMT is running.

See *Automatic motor tuning* in this manual for the AMT procedure.

Description of choice:

Select *Optimization on [2]* as part of the AMT procedure if you want the adjustable frequency drive to perform automatic motor tuning.

108 Stator resistance R_S (STATOR RESISTAN)

Value:

0.000 - X.XXX Ω ☆ Depends on choice of motor

Function:

After setting of parameters 102-106 *Nameplate data*, a number of adjustments of various parameters is carried out automatically, including stator resistance R_S . A manually entered R_S must apply to a cold motor. The shaft performance can be improved by fine-tuning R_S and X_S , see procedure below.



NOTE

Parameters 108 *Stator resistance R_S* and 109 *Stator reactance X_S* are normally not to be changed if nameplate data has been set.

☆ = factory setting, () = display text, [] = value for use in communication via serial communication port

Description of choice:

R_S can be set as follows:

1. Use the factory settings of R_S which the adjustable frequency drive itself chooses on the basis of the motor nameplate data.
2. The value is stated by the motor supplier.
3. The value is obtained through manual measurements: R_S can be calculated by measuring the resistance R_{PHASE-PHASE} between two phase terminals. Where R_{PHASE-PHASE} is lower than 1-2 Ohms (typical for motors > 7.5 HP, 400 V), a special Ohm-meter should be used (Thomson-bridge or similar). **R_S = 0.5 x R_{PHASE-PHASE}** .
4. R_S is set automatically when AMT has been completed. See parameter 107 *Auto motor tuning*.

109 Stator reactance X_S

(STATOR REACTANCE)

Value:

0.00 - X,XX Ω ☆ Depends on choice of motor

Function:

After parameters 102-106 *Nameplate data* are set, a number of parameters are adjusted automatically, including stator reactance X_S. The shaft performance can be improved by fine-tuning R_S and X_S; see procedure below.

Description of choice:

X_S can be set as follows:

1. The value is stated by the motor supplier.
2. The value is obtained through manual measurements; X_S is obtained by connecting a motor to line power and measuring the phase-phase voltage U_M and the idle current φ.

$$X_S = \frac{U_M}{\sqrt{3} \times I_\phi} - \frac{X_L}{2}$$

X_L: See parameter 142.

3. Use the factory settings of X_S, which the adjustable frequency drive itself chooses on the basis of the motor nameplate data.

117 Resonance damping

(resonance damping)

Value:

OFF 100 [OFF 100]

☆ Off [OFF]

Function:

It is possible to optimize the resonance damping in CT mode. The grade of the influence is adjusted in this parameter.

The value may be set between 0% (OFF) and 100%. 100% corresponds to 50% reduction of U/F ratio. Default value is OFF.

Internal settings (fixed):

The resonance filter is active from 10% of nominal speed and above.

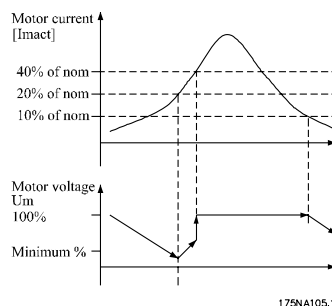
In this case 5Hz and above.

Speed to go from 0 to nominal flux level: 500ms

Speed to go from nominal to 0 flux level: 500 ms

Description of functionality:

The filter monitors the active motor current and changes the motor voltage according to the figure below. The filter reacts on levels referring to the nominal motor current.



If the active motor current is below 10%, the motor voltage will be decreased by the speed mentioned above until the voltage reaches the setting for Par. 117. If the active motor current comes over 20% the voltage will be increased by the above-mentioned speed. If the active motor current reaches 40% the motor voltage will be increased immediately to normal motor voltage.

The reduction in motor voltage depends on the parameter 117 setting.

☆ = factory setting, () = display text, [] = value for use in communication via serial communication port

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Description of choice:

Set the grade of Motor current [Imact] influence on the U/F ratio between 0% (OFF) and 100%. 100% corresponds to 50% reduction of U/F ratio. Default value is OFF.

119 High start torque

(High start torq.)

Value:

0.0 - 0.5 sec. ☆ 0.0 sec.

Function:

To ensure a high start torque approx. 1.8 x I_{INV} can be permitted for max. 0.5 sec. The current is, however, limited by the variable frequency drive's (inverter's) safety limit. 0 sec. corresponds to no high start torque.

Description of choice:

Set the necessary time for which a high start torque is required.

120 Start delay

(START DELAY)

Value:

0.0 - 10.0 sec. ☆ 0.0 sec.

Function:

This parameter enables a delay of the start-up time after the conditions for start have been fulfilled. When the time has passed, the output frequency will start by ramping up to the reference.

Description of choice:

Set the necessary time before commencing to accelerate.

121 Start function

(START FUNCTION)

Value:

- DC hold during start delay time
(DC HOLD/DELAY TIME) [0]
- DC brake during start delay time
(DC BRAKE/DELAY TIME) [1]
- ☆ Coasting during start delay time [2]

(COAST/DELAY TIME)

Start frequency/voltage clockwise
(CLOCKWISE OPERATION) [3]

Start frequency/voltage in reference direction
(VERTICAL OPERATION) [4]

Function:

This is where to choose the required mode during the start delay time (parameter 120 *Start delay time*).

Description of choice:

Select *DC hold during start delay time* [0] to energize the motor with a DC hold voltage during the start delay time. Set voltage in parameter 137 *DC hold voltage*.

Choose *DC brake during start delay time* [1] to energize the motor with a DC brake voltage during the start delay time. Set voltage in parameter 132 *DC brake voltage*.

Choose *Coasting during start delay time* [2] and the motor will not be controlled by the adjustable frequency drive during the start delay time (inverter turned off).

Choose *Start frequency/voltage clockwise* [3] to obtain the function described in parameter 130 *Start frequency* and 131 *Voltage at start* during start delay time. Regardless of the value assumed by the reference signal, the output frequency equals the setting in parameter 130 *Start frequency* and the output voltage will correspond to the setting in parameter 131 *Voltage at start*.

This functionality is typically used in hoist applications. It is used in particular in applications in which a cone anchor motor is applied, where the direction of rotation is to start clockwise followed by the reference direction.

Select *Start frequency/voltage in reference direction* [4] to obtain the function described in parameter 130 *Start frequency* and 131 *Voltage at start* during the start delay time.

The direction of rotation of the motor will always follow in the reference direction. If the reference signal equals zero, the output frequency will equal 0 Hz, while the output voltage will correspond to the setting in parameter 131 *Voltage at start*. If the reference signal is different from zero, the output frequency will equal parameter 130 *Start frequency* and the output voltage will equal parameter 131 *Voltage at start*. This functionality is used typically for hoist applications with counter-

☆ = factory setting, () = display text, [] = value for use in communication via serial communication port

weight. It is used in particular for applications in which a cone anchor motor is applied. The cone anchor motor can break away using parameter 130 *Start frequency* and parameter 131 *Voltage at start*.

| | |
|---------------------------|-------------------------|
| 122 | Function at stop |
| (FUNCTION AT STOP) | |

Value:

- ★ Coasting (COAST) [0]
- DC hold (DC HOLD) [1]

Function:

This is where to choose the function of the variable frequency drive after the output frequency has become lower than the value in parameter 123 *The min. frequency for activation of function at stop* or after a stop command and when the output frequency has been ramped down to 0 Hz.

Description of choice:

Select *Coasting* [0] if the variable frequency drive is to 'let go' of the motor (inverter turned off).

Select DC hold [1] if parameter 137 *DC hold voltage* is to be activated.

| | |
|--------------------------|--|
| 123 | Min. frequency for activation of function at stop |
| (MIN.F.FUNC.STOP) | |

Value:

- 0,1 - 10 Hz ★ 0,1 Hz

Function:

In this parameter, the output frequency is set at which the function selected in parameter 122 *Function at stop* is to be activated.

Description of choice:

Set the required output frequency.


NOTE

If parameter 123 is set higher than parameter 130, then the start delay function (parameter 120 and 121) will be skipped.


NOTE

If parameter 123 is set too high, and DC hold has been chosen in parameter 122, the output frequency will jump to the value in parameter 123 without ramping up. This may cause an overcurrent warning / alarm.

| | |
|--------------------------|----------------------|
| 126 | DC brake time |
| (DC BRAKING TIME) | |

Value:

- 0 - 60 sec. ★ 10 sec

Function:

In this parameter, the DC brake time is set at which parameter 132 *DC brake voltage* is to be active.

Description of choice:

Set the required time.

| | |
|--------------------------|----------------------------------|
| 127 | DC brake cut-in frequency |
| (DC BRAKE CUT-IN) | |

Value:

- 0.0 (OFF) - par. 202 ★ OFF
- Output frequency high limit, f_{MAX}*

Function:

In this parameter, the DC brake cut-in frequency is set at which the DC brake is to be activated in connection with a stop command.

Description of choice:

Set the required frequency.

| | |
|---------------------------|---------------------------------|
| 128 | Thermal motor protection |
| (MOT.THERM PROTEC) | |

Value:

- ★ No protection (NO PROTECTION) [0]
- Thermistor warning (THERMISTOR WARN) [1]
- Thermistor trip (THERMISTOR TRIP) [2]
- ETR warning 1 (ETR WARNING 1) [3]
- ETR trip 1 (ETR TRIP 1) [4]

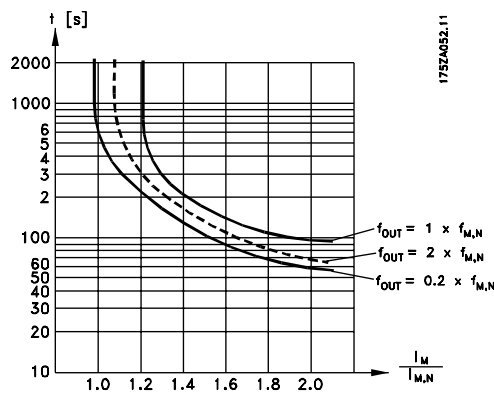
★ = factory setting, () = display text, [] = value for use in communication via serial communication port

| | |
|-------------------------------|------|
| ETR warning 2 (ETR WARNING 2) | [5] |
| ETR trip 2 (ETR TRIP 2) | [6] |
| ETR warning 3 (ETR WARNING 3) | [7] |
| ETR trip 3 (ETR TRIP 3) | [8] |
| ETR warning 4 (ETR WARNING 4) | [9] |
| ETR trip 4 (ETR TRIP 4) | [10] |

Function:

The adjustable frequency drive can monitor the motor temperature in two different ways:

- Via a PTC thermistor that is mounted on the motor. The thermistor is connected between terminal 50 (+10V) and one of the digital input terminals 18, 19, 27 or 29. See parameter 300 *Digital inputs*.
- Thermal load calculation (ETR - Electronic Thermal Relay), based on present load and time. This is compared with the rated motor current $I_{M,N}$ and rated motor frequency $f_{M,N}$. The calculations take into account the need for lower loading at low speeds due to the motor's internal ventilation being reduced.



ETR functions 1-4 do not begin to calculate the load until you switch to the Setup in which they have been selected. This means that you can use the ETR function even when changing between two or more motors.

Description of choice:

Select *No protection* [0] if you do not want a warning or trip when a motor is overloaded.
 Select *Thermistor warning* [1] if you want a warning when the connected thermistor becomes too hot.
 Select *Thermistor trip* [2] if you want a trip when the connected thermistor becomes too hot.

Select *ETR warning 1-4* if you want a warning when the motor is overloaded according to the calculations. You can also program the adjustable frequency drive to give a warning signal via one of the digital outputs. Select *ETR Trip 1-4* if you want a trip when the motor is overloaded according to the calculations.



NOTE

This function cannot protect the individual motors in the case of motors linked in parallel.

130 Start frequency (Start frequency)

Value:
0.0 - 10.0 Hz ☆ 0.0 Hz

Function:

The start frequency is active for the time set in parameter 120 *Start delay*, after a start command. The output frequency will 'jump' to the next preset frequency. Certain motors, such as conical anchor motors, need an extra voltage/start frequency (boost) at start to disengage the mechanical brake. To achieve this parameters 130 *Start frequency* and 131 *Initial voltage* are used.

Description of choice:

Set the required start frequency. It is a precondition that parameter 121 *Start function*, is set to *Start frequency/voltage clockwise* [3] or *Start frequency voltage in reference direction* [4] and that in parameter 120 *Start delay* a time is set and a reference signal is present.



NOTE

If parameter 123 is set higher than parameter 130, the start delay function (parameter 120 and 121) will be skipped.

131 Initial voltage (INITIAL VOLTAGE)

Value:
0.0 - 200.0 V ☆ 0.0 V

☆ = factory setting, () = display text, [] = value for use in communication via serial communication port

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Function:

Initial voltage is active for the time set in parameter 120 *Start delay*, after a start command. This parameter can be used for example for lifting/dropping applications (conical anchor motors).

Description of choice:

Set the required voltage necessary to cut out the mechanical brake. It is assumed that parameter 121 *Start function*, is set to *Start frequency/voltage clockwise* [3] or *Start frequency/voltage in reference direction* [4] and that in parameter 120 *Start delay* a time is set, and that a reference signal is present.

132 DC brake voltage

(DC BRAKE VOLTAGE)

Value:

0 - 100% of max. DC brake voltage ☆ 0%

Function:

In this parameter, the DC brake voltage is set which is to be activated at stop when the DC brake frequency set in parameter 127 *DC brake cut-in frequency* is reached, or if *DC braking inverse* is active via a digital input or via serial communication. Subsequently, the DC brake voltage will be active for the time set in parameter 126 *DC brake time*.

Description of choice:

To be set as a percentage value of the max. DC brake voltage, which depends on the motor.

133 Start voltage

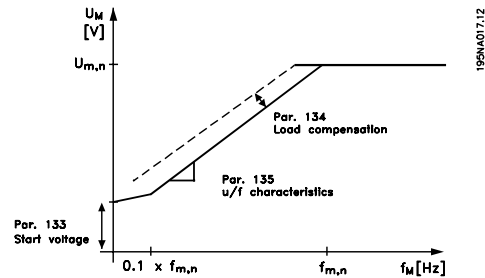
(START VOLTAGE)

Value:

0.00 - 100.00 V ☆ Depends on unit

Function:

A higher start torque can be obtained by increasing the start voltage. Small motors (< 1.0 HP) normally require a high start voltage.



Description of choice:

The factory setting will be suitable for most applications, the value may need to be increased gradually for high torque application.



Warning: If the use of start voltage is exaggerated, this may lead to over-energizing and overheating of the motor and the variable frequency drive may cut out.

134 Load compensation

(LOAD COMPENSATIO)

Value:

0.0 - 300.0% ☆ 100.0%

Function:

In this parameter, the load characteristic is set. By increasing the load compensation, the motor is given an extra voltage and frequency supplement at increasing loads. This is used e.g. in motors/applications in which there is a big difference between the full-load current and idle-load current of the motor.



NOTE

If this value is set too high, the variable frequency drive may cut out because of overcurrent.

Description of choice:

If the factory setting is not adequate, load compensation must be set to enable the motor to start at the given load.



Warning: Should be set to 0% in connection with synchronous and parallel-coupled motors and in the case of quick load changes. Too high load compensation may lead to instability.

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135 U/f-ratio (U/f RATIO)

Value:

0.00 - 20.00 at Hz ☆ Depends on unit

Function:

This parameter enables a linear shift in the ratio between output voltage (V) and output frequency (f) to ensure correct energizing of the motor and thus optimum dynamics, accuracy and efficiency. The V/f-ratio only affects the voltage characteristic if *Constant torque* [1] has been selected in parameter 101 *Torque characteristic*.

Description of choice:

Change the V/f-ratio only if it is not possible to set the correct motor data in parameters 102-109. The value programmed in the factory settings is based on idle operation.

136 Slip compensation (SLIP COMP.)

Value:

-500 - +500% of rated slip compensation ☆ 100%

Function:

Slip compensation is calculated automatically, on the basis of such data as the rated motor speed $n_{M,N}$. In this parameter, the slip compensation can be fine-tuned, thereby compensating for tolerances on the value for $n_{M,N}$. Slip compensation is only active if a selection has been made of *Speedregulation, open loop* [0] in parameter 100 *Configuration* and *Constant torque* [1] in parameter 101 *Torque characteristic*.

Description of choice:

Key in a % value.

137 DC hold voltage (DC HOLD VOLTAGE)

Value:

0 - 100% of max. DC hold voltage ☆ 0%

Function:

This parameter is used to keep the motor (holding torque) at start/stop.

Description of choice:

This parameter can only be used if a selection has been made of *DC hold* in parameter 121 *Start function* or 122 *Function at stop*. To be set as a percentage value of the max. DC hold voltage, which depends on the choice of motor.

138 Brake cut out value (Brake cut out)

Value:

0.5 - 132.0/1000.0 Hz ☆ 3.0 Hz

Function:

Select the frequency at which the external brake is released, via the output defined in parameter 323 *Relay output 1-3* or 341 *Digital output, terminal 46*.

Description of choice:

Set the required frequency.

139 Brake cut in frequency (Brake cut in)

Value:

0.5 - 132.0/1000.0 Hz ☆ 3.0 Hz

Function:

Select the frequency at which the external brake is activated; this takes place via the output defined in parameter 323 *Relay output 1-3* or 341 *Digital output terminal 46*.

Description of choice:

Set the required frequency.

140 Current, minimum value (CURRENT MIN VAL)

Value:

0 % - 100 % of inverter output current ☆ 0 %

☆ = factory setting, () = display text, [] = value for use in communication via serial communication port

Function:

This is where the user selects the minimum motor current running for the mechanical brake to be released. Current monitoring is only active from stop until the point when the brake is released.

Description of choice:

This is an extra safety precaution, aimed at guaranteeing that the load is not lost during start of a lifting/lowering operation.

142 Leakage reactance X_L (LEAK. REACTANCE)

Value:

0.000 - XXX,XXX Ω ☆ Depends on choice of motor
 X_L is the sum of rotor and stator leakage reactance.

Function:

After setting of parameters 102-106 *Nameplate data*, a number of adjustments of various parameters is made automatically, including the leakage reactance X_L . The shaft performance can be improved by fine-tuning the leakage reactance X_L .



NOTE

Parameter 142 *The leakage reactance X_L* is normally not to be changed if the nameplate data has been set, parameters 102-106.

Description of choice:

X_L can be set as follows:

1. The value is stated by the motor supplier.
2. Use the factory settings of X_L , which the adjustable frequency drive itself chooses on the basis of the motor nameplate data.

143 Internal fan control (fan control)

Value:

☆ Automatic (automatic) [0]
Always switched on (always on) [1]

Always switched off (always off) [2]

Function:

This parameter can be set so that the internal fan is automatically switched on and off. You can also set the internal fan to be permanently switched on or off.

Description of choice:

If *Automatic* [0] is selected, the internal fan is switched on or off depending on the ambient temperature and the loading of the adjustable frequency drive.

If *Always switched on* [1] or *Always switched off* [2] is selected, the internal fan will be permanently switched on or off, respectively.



NOTE

If *Always switched off* [2] is selected in combination with high switch frequency, long motor cables or high output power, the adjustable frequency drive's life span is reduced. This applies in particular to 1.5, 2, 4 and 5 HP units.

144 Gain AC brake (Gain AC brake)

Value:

1.00 - 1.50 ☆ 1.30

Function:

This parameter is used to set the AC brake. Using par. 144 it is possible to adjust the size of the generator torque that can be applied to the motor without the intermediate circuit voltage exceeding the warning level.

Description of choice:

The value is increased if a greater possible brake torque is required. If 1.0 is selected, this corresponds to the AC brake being inactive.



NOTE

If the value in par. 144 is increased, the motor current will simultaneously increase significantly when generator loads are applied. The parameter should therefore only be changed if it is guaranteed during measurement that the motor current in all

☆ = factory setting, () = display text, [] = value for use in communication via serial communication port

operating situations will never exceed the maximum permitted current in the motor.

Please note: that the current cannot be read out from the display.

146 Reset voltage vector**(RESET VECTOR)****Value:**

| | |
|---------------|-----|
| *Off (OFF) | [0] |
| Reset (RESET) | [1] |

Function:

When the voltage vector is reset it is set to the same starting point each time a new process commences.

Description of choice:

Select reset (1) when running unique processes each time they arise. This will enable repetitive precision when stopping to be improved. Select Off (0) for example for lifting/lowering operations or synchronous motors. It is an advantage that the motor and the variable frequency drive are always synchronized.

■ References & Limits

200 Output frequency range (OUT FREQ. RNG/ROT)

Value:

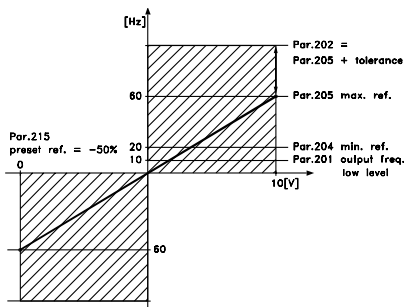
- ★ Only clockwise, 0 - 132 Hz (132 Hz CLOCKWISE) [0]
- Both directions, 0 - 132 Hz (132 Hz BOTH DIRECT) [1]
- Counter-clockwise only, 0 - 132 Hz (132 Hz COUNTER CLOCK) [2]
- Clockwise only, 0 - 1,000 Hz (1,000 Hz CLOCK WISE) [3]
- Both directions, 0 - 1,000 Hz (1,000 Hz BOTH DIRECT) [4]
- Counter-clockwise only, 0 - 1,000 Hz (1,000 Hz COUNTER CLOCK) [5]

Function:

This parameter guarantees protection against unwanted reversing. Furthermore, the maximum output frequency that is to apply regardless of the settings of other parameters can be selected. This parameter has no function if *Process regulation, closed-loop* has been selected in parameter 100 *Configuration*.

Description of choice:

Select the required direction of rotation as well as the maximum output frequency. Please note that if *Clockwise only* [0]/[3] or *Counter-clockwise only* [2]/[5] is selected, the output frequency will be limited to the range f_{MIN} - f_{MAX} . If *Both directions* [1]/[4] is selected, the output frequency will be limited to the range $\pm f_{MAX}$ (the minimum frequency is of no significance).



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201 Output frequency low limit, f_{MIN} (MIN OUTPUT FREQ)

Value:

0.0 - f_{MAX} ★ 0.0 Hz

Function:

In this parameter, a minimum motor frequency limit can be selected that corresponds to the minimum speed at which the motor is allowed to run. If *Both directions* has been selected in parameter 200 *Output frequency range*, the minimum frequency is of no significance.

Description of choice:

The value chosen can range from 0.0 Hz to the frequency set in parameter 202 *Output frequency high limit, f_{MAX}* .

202 Output frequency high limit, f_{MAX} (max. output freq)

Value:

f_{MIN} - 132/1,000 Hz (par. 200 *Output frequency range*) ★ 132 Hz

Function:

In this parameter, a maximum output frequency limit can be selected that corresponds to the highest speed at which the motor is allowed to run.



NOTE

The output frequency of the adjustable frequency drive can never assume a value higher than 1/10 of the switching frequency (parameter 411 *Switching frequency*).

Description of choice:

A value can be selected from f_{MIN} to the value chosen in parameter 200 *Output frequency range*.

★ = factory setting, () = display text, [] = value for use in communication via serial communication port

203 Reference range
(REFERENCE RANGE)
Value:

- ★ Min. reference - Max reference (min - max) [0]
- Max. reference - Max. reference (-max - +max) [1]

Function:

In this parameter you select whether the reference signal must be positive or whether it can be both positive and negative. The minimum limit may be a negative value, unless in parameter 100 *Configuration* a selection has been made of *Speed regulation, closed loop*. You should select *Min ref. - Max. ref.* [0], if *Process regulation, closed loop* [3] has been selected in parameter 100 *Configuration*.

Description of choice:

Select the required range.

204 Minimum reference, Ref_{MIN}
(Min.reference)
Value:

- Par. 100 *Config. = Open loop* [0].-100,000.000 - par. 205 Ref_{MAX} ★ 0.000 Hz
- Par. 100 *Config. = Closed loop* [1]/[3].- Par. 414 *Minimum feedback* - par. 205 Ref_{MAX} ★ 0.000 rpm/par 416

Function:

Minimum reference is an expression of the minimum possible value of the total of all references. If in parameter 100 *Configuration*, *Speed regulation, closed loop* [1] or *Process regulation, closed loop* [3] is selected, the minimum reference is limited by parameter 414 *Minimum feedback*. Minimum reference is ignored if the local reference is active.

The reference unit can be defined from the following table:

| Par. 100 <i>Configuration</i> | Unit |
|-------------------------------|----------|
| Open loop [0] | Hz |
| Speed reg, closed loop [1] | rpm |
| Process reg, closed loop [3] | Par. 416 |

Description of choice:

The minimum reference is preset if the motor has to run at a minimum speed, regardless of whether the resulting reference is 0.

205 Maximum reference, Ref_{MAX}
(max.reference)
Value:

- Par. 100 *Config. = Open loop* [0].Par. 204 Ref_{MIN} - 1000.000 Hz ★ 50.000 Hz
- Par. 100 *Config. = Closed loop* [1]/ [3]. Par. 204 Ref_{MIN} - Par. 415 *Max. feedback* ★ 50.000 rpm/par 416

Function:

The maximum reference gives the highest value that can be assumed by the sum of all references. If *Closed loop* [1]/[3] is selected in parameter 100 *Configuration* the maximum reference cannot exceed the value in parameter 415 *Maximum feedback*.

Maximum reference is ignored if the local reference is active.

The reference unit can be defined from the following table:

| Par. 100 <i>Configuration</i> | Unit |
|-------------------------------|----------|
| Open loop [0] | Hz |
| Speed reg, closed loop [1] | rpm |
| Process reg, closed loop [3] | Par. 416 |

Description of choice:

Maximum reference is set, if the speed of the motor is to be max. the set value, regardless of the whether the resulting reference is greater than the maximum reference.

206 Ramp type
(Ramp type)
Value:

- ★ Linear (Linear) [0]
- Sine shaped (S-SHAPED) [1]
- Sine² shaped (S-SHAPED 2) [2]

★ = factory setting, () = display text, [] = value for use in communication via serial communication port

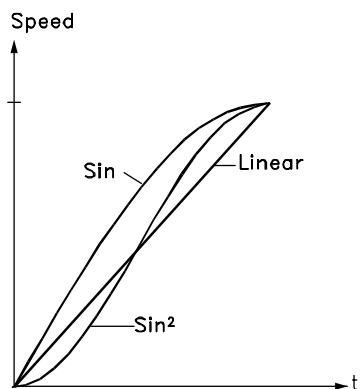
VLT® 2800 Series

Function:

You can choose between a linear, a sine-shaped and a sine²-shaped ramp process.

Description of choice:

Select the required ramp type depending on requirements for the acceleration/deceleration process.



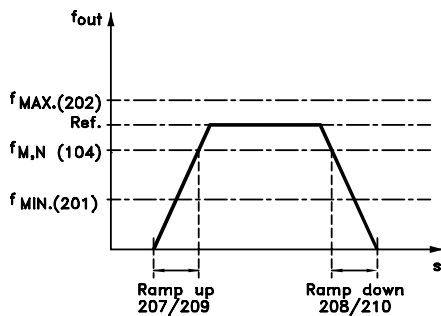
207 Ramp-up time 1 (Ramp-up time 1)

Value:

0.02 - 3600.00 sec ☆ 3.00 sec (VLT 2803-2875)
10.00 sec (VLT 2880-2882)

Function:

The ramp-up time is the acceleration time from 0 Hz to the rated motor frequency $f_{M,N}$ (parameter 104 *Motor frequency, $f_{M,N}$*). It is assumed that the output current will not reach the current limit (set in parameter 221 *Current limit I_{LM}*).



Description of choice:

Set the required ramp-up time.

208 Ramp-down time 1 (ramp down time 1)

Value:

0.02 - 3600.00 sec ☆ 3.00 sec (VLT 2803-2875)
10.00 sec (VLT 2880-2882)

Function:

The ramp-down time is the deceleration time from the rated motor frequency $f_{M,N}$ (parameter 104 *Motor frequency, $f_{M,N}$*) to 0 Hz, provided no overvoltage arises in the inverter because of generating operation of the motor.

Description of choice:

Set the required ramp-down time.

209 2 Ramp-up time (2 Ramp-up time)

Value:

0.02 - 3600.00 sec. ☆ 3.00 sec (VLT 2803-2875)
10.00 sec (VLT 2880-2882)

Function:

See description of parameter 207 *Ramp-up time 1*.

Description of choice:

Set the required ramp-up time. Shift from ramp 1 to ramp 2 by activating *Ramp 2* via a digital input.

210 2 Ramp-down time (ramp down time 2)

Value:

0.02 - 3600.00 sec. ☆ 3.00 sec (VLT 2803-2875)
10.00 sec (VLT 2880-2882)

Function:

See description of parameter 208 *Ramp-down time 1*.

Description of choice:

Set the required ramp-down time. Shift from ramp 1 to ramp 2 by activating *Ramp 2* via a digital input.

211 Jog ramp time (Jog ramp time)

Value:

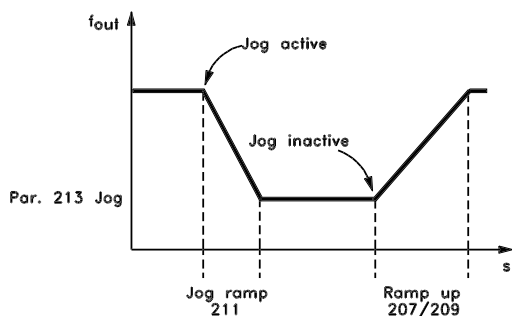
0.02 - 3600.00 sec. ☆ 3.00 sec (VLT 2803-2875)

☆ = factory setting, () = display text, [] = value for use in communication via serial communication port

10.00 sec (VLT 2880-2882)

Function:

The jog ramp time is the acceleration/deceleration time from 0 Hz to the rated motor frequency $f_{M,N}$ (parameter 104 *Motor frequency, $f_{M,N}$*). It is assumed that the output current will not reach the current limit (set in parameter 221 *Current limit I_{LIM}*).



The jog ramp time starts if a jog-signal is given via the LCP control panel, one of the digital inputs or the serial communication port.

Description of choice:

Set the required ramp time.

212 Quick-stop ramp-down time (Q STOP RAMP TIME)

Value:

0.02 - 3600.00 sec. ☆ 3.00 sec (VLT 2803-2875)
10.00 sec (VLT 2880-2882)

Function:

The quick-stop ramp-down time is the deceleration time from the rated motor frequency to 0 Hz, provided no overvoltage arises in the inverter because of generating operation of the motor, or if the generated current exceeds the current limit in parameter 221 *Current limit I_{LIM}* . Quick-stop is activated via one of the digital inputs or the serial communication.

Description of choice:

Set the required ramp-down time.

213 Jog frequency (Jog frequency)

Value:

0.0 - Par. 202 Output frequency high limit, f_{MAX} ☆ 10.0 Hz

Function:

Jog frequency f_{JOG} means a fixed output frequency that the variable frequency drive supplies to the motor when the Jog function is activated. Jog can be activated via the digital inputs, serial communication or via the LCP control panel, on the condition that this is active in parameter 015 *Local jog*.

Description of choice:

Set the required frequency.

214 Reference function (Ref function)

Value:

☆ Sum (sum) [0]
Relative (relative) [1]
External/preset (external/preset) [2]

Function:

It is possible to define how preset references are to be added to the other references; for this purpose, use *Sum* or *Relative*. It is also possible by using the *External/preset* to select whether a shift between external references and preset references is required. External reference is the sum of the analog references, pulse references and any references from serial communication.

Description of choice:

If *Sum* [0] is selected, one of the adjusted preset references (parameters 215-218 *Preset reference*) is summarized as a percentage of the reference range ($Ref_{MIN} - Ref_{MAX}$), added to the other external references.

If *Relative* [1] is selected, one of the added preset references (parameters 215-218 *Preset reference*) is summarized as a percentage of the sum of present external references.

If *External/preset* [2] is selected, it is possible via a digital input to shift between external references or preset

☆ = factory setting, () = display text, [] = value for use in communication via serial communication port

references. Preset references will be a percentage value of the reference range.



NOTE

If Sum or Relative is selected, one of the preset references will always be active. If the preset references are to be without influence, they must be set to 0% (factory setting).

| | |
|---------------------|---|
| 215 | Preset reference 1 (PRESET REF. 1) |
| 216 | Preset reference 2 (PRESET REF. 2) |
| 217 | Preset reference 3 (PRESET REF. 3) |
| 218 | Preset reference 4 (PRESET REF. 4) |
| Value: | |
| -100.00% - +100.00% | ★ 0.00% |

of the reference range/external reference

Function:

Four different preset references can be programmed in parameters 215-218 *Preset reference*. The preset reference is stated as a percentage of the reference range (Ref_{MIN} - Ref_{MAX}) or as a percentage of the other external references, depending on the choice made in parameter 214 *Reference function*. The choice between preset references can be made via the digital inputs or via serial communication.

| Preset ref., msb | Preset ref. lsb | |
|------------------|-----------------|---------------|
| 0 | 0 | Preset ref. 1 |
| 0 | 1 | Preset ref. 2 |
| 1 | 0 | Preset ref. 3 |
| 1 | 1 | Preset ref. 4 |

Description of choice:

Set the preset reference(s) that is/are to be the options.

| | |
|------------------------------------|-------------------------------------|
| 219 | Catch up/Slow down reference |
| (Catch up/Slw dwn) | |
| Value: | |
| 0.00 - 100% of the given reference | ★ 0.00% |

Function:

In this parameter, the percentage value can be set which will either be added to or deducted from the remote-controlled references.

The remote-controlled reference is the sum of preset references, analog references, pulse reference and any references from serial communication.

Description of choice:

If *Catch up* is active via a digital input, the percentage value in parameter 219 *Catch up/Slow down reference* will be added to the remote-controlled reference. If *Slow down* is active via a digital input, the percentage value in parameter 219 *Catch up/Slow down reference* will be deducted from the remote-controlled reference.

| | |
|-------------------------|---------------------------------------|
| 221 | Current limit, I_{LIM} |
| (current limit) | |
| Value: | |
| 0 - XXX.X % of par. 105 | ★ 160 % |

Function:

In this parameter, the maximum output current I_{LIM} is set. The factory-set value corresponds to the maximum output current I_{MAX}. If the current limit is to be used as motor protection, set the rated motor current. If the current limit is set above 100% (the rated output current of the variable frequency drive, I_{INV}), the variable frequency drive can only handle a load intermittently, i.e. for short periods at a time. After the load has been higher than I_{INV}, it must be ensured that for a period the load is lower than I_{INV}. Please note that if the current limit is set at a lower value than I_{INV}, the acceleration torque will be reduced to the same extent.

Description of choice:

Set the required maximum output current I_{LIM}.

| | |
|--|--|
| 223 | Warning: Low current, I_{Low} |
| (warn. current lo) | |
| Value: | |
| 0.0 - par. 224 <i>Warning: High current</i> , I _{HIGH} | ★ 0.0 A |

Function:

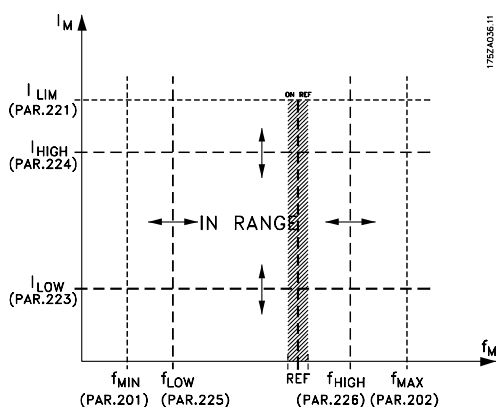
If the output current falls below the preset limit I_{Low} a warning is given.

★ = factory setting, () = display text, [] = value for use in communication via serial communication port

Parameters 223-228 *Warning functions* are out of function during ramp-up after a start command and after a stop command or during stop. The warning functions are activated when the output frequency reaches the resulting reference. The signal outputs can be programmed to give a warning signal via terminal 46 and via the relay output.

Description of choice:

The lower signal limit of the output current I_{LOW} must be programmed within the normal working range of the unit.



224 Warning: High current, I_{HIGH} (warn. current hi)

Value:

0 - I_{MAX} ★ I_{MAX}

Function:

If the output current exceeds the preset limit I_{HIGH} a warning is given.

Parameters 223-228 *Warning functions* do not work during ramp-up after a start command and after stop command or during stop. The warning functions are activated when the output frequency has reached the resulting reference. The signal outputs can be programmed to give a warning signal via terminal 46 and via the relay output.

Description of choice:

The output current's upper signal limit I_{HIGH} must be programmed within the variable frequency drive's normal operating range. See drawing at parameter 223 *Warning: Low current, I_{LOW}* .

225 Warning: Low frequency, f_{LOW} (warn.freq. low)

Value:

0.0 - par. 226
Warn.: High frequency, f_{HIGH} ★ 0.0 Hz

Function:

If the output frequency falls below the preset limit f_{LOW} , a warning is given.

Parameters 223-228 *Warning functions* are out of function during ramp-up after a start command and after stop command or during stop. The warning functions are activated when the output frequency has reached the resulting reference. The signal outputs can be programmed to give a warning signal via terminal 46 and via the relay output.

Description of choice:

The lower signal limit of the output frequency f_{LOW} must be programmed within the normal operating range of the variable frequency drive. See drawing at parameter 223 *Warning: Low current, I_{LOW}* .

226 Warning: High frequency f_{HIGH} (warn.freq.high)

Value:

Par. 200 *Frequency range* = 0-132 Hz
[0]/[1].par. 225 f_{LOW} - 132 Hz ★ 132.0 Hz
Par. 200 *Frequency range* = 0-1000 Hz
[2]/[3].par. 225 f_{LOW} - 1000 Hz ★ 132.0 Hz

Function:

If the output frequency exceeds the preset limit f_{HIGH} a warning is given.

Parameters 223-228 *Warning functions* do not work during ramp-up after a start command and after stop command or during stop. The warning functions are activated when the output frequency has reached the resulting reference. The signal outputs can be programmed to give a warning signal via terminal 46 and via the relay output.

Description of choice:

The output frequency's upper signal limit f_{HIGH} must be programmed within the variable frequency drive's normal operating range. See drawing at parameter 223 *Warning: Low current, I_{LOW}* .

★ = factory setting, () = display text, [] = value for use in communication via serial communication port

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227 Warning: Low feedback, FB_{LOW} (warn.feedb. low)

Value:

-100,000.000 - par. 228 *Warn.:*

FB_{HIGH} ☆ -4000.000

Function:

If the feedback signal falls below the preset limit FB_{LOW} , a warning is given.

Parameters 223-228 *Warning functions* are out of function during ramp-up after a start command and after a stop command or during stop. The warning functions are activated when the output frequency has reached the resulting reference. The signal outputs can be programmed to give a warning signal via terminal 46 and via the relay output. The unit for feedback in Closed loop is programmed in parameter 416 *Process units*.

Description of choice:

Set the required value within the feedback range (parameter 414 *Minimum feedback*, FB_{MIN} and 415 *Maximum feedback*, FB_{MAX}).

228 Warning: High feedback, FB_{HIGH} (warn.feedb high)

Value:

Par. 227 *Warn.:* FB_{LOW} - 100,000.000 ☆ 4000.000

Function:

If the feedback signal gets above the preset limit FB_{HIGH} , a warning is given.

Parameters 223-228 *Warning functions* are out of function during ramp-up after a start command and after a stop command or during stop. The warning functions are activated when the output frequency has reached the resulting reference. The signal outputs can be programmed to give a warning signal via terminal 46 and via the relay output. The unit for feedback in Closed loop is programmed in parameter 416 *Process units*.

Description of choice:

Set the required value within the feedback range (parameter 414 *Minimum feedback*, FB_{MIN} and 415 *Maximum feedback*, FB_{MAX}).

229 Frequency bypass, bandwidth (FREQ BYPASS B.W.)

Value:

0 (OFF) - 100 Hz ☆ 0 Hz

Function:

Some systems call for some output frequencies to be avoided because of mechanical resonance problems in the system. In parameters 230-231 *Frequency bypass*, these output frequencies can be programmed. In this parameter, a bandwidth can be defined on either side of these frequencies.

Description of choice:

The frequency set in this parameter will be centered around parameters 230 *Frequency bypass 1* and 231 *Frequency bypass 2*.

230 Frequency bypass 1 (FREQ. BYPASS 1)

231 Frequency bypass 2 (FREQ. BYPASS 2)

Value:

0 - 1000 Hz ☆ 0.0 Hz

Function:

Some systems call for some output frequencies to be avoided because of mechanical resonance problems in the system.

Description of choice:

Enter the frequencies to be avoided. See also parameter 229 *Frequency bypass, bandwidth*.

Inputs and Outputs

| Digital inputs | Term. no. | 18 ¹ | 19 ¹ | 27 | 29 | 33 |
|----------------------------|------------------------|-----------------|-----------------|-------|--------|-------|
| | par. no. | 302 | 303 | 304 | 305 | 307 |
| Value: | | | | | | |
| No function | (NO OPERATION) | [0] | [0] | [0] | [0] | ★ [0] |
| Reset | (RESET) | [1] | [1] | [1] | [1] | [1] |
| Coasting stop inverse | (MOTOR COAST INVERSE) | [2] | [2] | [2] | [2] | [2] |
| Reset and coasting inverse | (RESET AND COAST INV.) | [3] | [3] | ★ [3] | [3] | [3] |
| Quick-stop inverse | (QUICK-STOP INVERSE) | [4] | [4] | [4] | [4] | [4] |
| DC braking inverse | (DC BRAKE INVERSE) | [5] | [5] | [5] | [5] | [5] |
| Stop inverse | (STOP INVERSE) | [6] | [6] | [6] | [6] | [6] |
| Start | (START) | ★ [7] | [7] | [7] | [7] | [7] |
| Pulse start | (LATCHED START) | [8] | [8] | [8] | [8] | [8] |
| Reversing | (REVERSING) | [9] | ★ [9] | [9] | [9] | [9] |
| Reversing and start | (START REVERSING) | [10] | [10] | [10] | [10] | [10] |
| Start clockwise | (ENABLE FORWARD) | [11] | [11] | [11] | [11] | [11] |
| Start counter-clockwise | (ENABLE REVERSE) | [12] | [12] | [12] | [12] | [12] |
| Jog | (JOGGING) | [13] | [13] | [13] | ★ [13] | [13] |
| Freeze reference | (FREEZE REFERENCE) | [14] | [14] | [14] | [14] | [14] |
| Freeze output frequency | (FREEZE OUTPUT) | [15] | [15] | [15] | [15] | [15] |
| Speed up | (SPEED UP) | [16] | [16] | [16] | [16] | [16] |
| Slow | (SLOW) | [17] | [17] | [17] | [17] | [17] |
| Catch-up | (CATCH-UP) | [19] | [19] | [19] | [19] | [19] |
| Slow-down | (SLOW-DOWN) | [20] | [20] | [20] | [20] | [20] |
| Ramp 2 | (RAMP 2) | [21] | [21] | [21] | [21] | [21] |
| Preset ref, LSB | (PRESET REF, LSB) | [22] | [22] | [22] | [22] | [22] |
| Preset ref, MSB | (PRESET REF, MSB) | [23] | [23] | [23] | [23] | [23] |
| Preset reference on | (PRESET REFERENCE ON) | [24] | [24] | [24] | [24] | [24] |
| Thermistor | (THERMISTOR) | [25] | [25] | [25] | [25] | |
| Precise stop, inverse | (PRECISE STOP INV.) | [26] | [26] | | | |
| Precise start/stop | (PRECISE START/STOP) | [27] | [27] | | | |
| Pulse reference | (PULSE REFERENCE) | | | | | [28] |
| Pulse feedback | (PULSE FEEDBACK) | | | | | [29] |
| Pulse input | (PULSE INPUT) | | | | | [30] |
| Selection of Set-up, lsb | (SET-UP SELECT LSB) | [31] | [31] | [31] | [31] | [31] |
| Selection of Set-up, msb | (SET-UP SELECT MSB) | [32] | [32] | [32] | [32] | [32] |
| Reset and start | (RESET AND START) | [33] | [33] | [33] | [33] | [33] |
| Pulse counter start | (PULSE COUNTER START) | [34] | [34] | | | |

1. All functions on terminals 18 and 19 are controlled by an interrupter, which means that the repetitive accuracy of the response time is constant. Can be used for start/stop, set-up switch, and especially for changing digital preset, i.e., to obtain a reproducible stop point when using creep speed. For further information, see VLT 2800 Precise Stop Instruction, MI.28.CX.02.

Function:

In these parameters, 302-307 *Digital inputs*, it is possible to choose between the different enabled functions related to the digital inputs (terminals 18-33).

★ = factory setting, () = display text, [] = value for use in communication via serial communication port