

## 9 SMARTCARD operation

### 9.1 Introduction

This is a standard feature that enables simple configuration of parameters in a variety of ways. The SMARTCARD can be used for:

- Parameter copying between drives
- Saving whole drive parameter sets
- Saving 'differences from default' parameter sets
- Storing Onboard PLC programs
- Automatically saving all user parameter changes for maintenance purposes
- Loading complete motor map parameters.

Refer to Figure 9-1 for installing the SMARTCARD. Ensure the SMARTCARD is inserted with the MP arrow pointing upwards.

The drive only communicates with the SMARTCARD when commanded to read or write, this means that the card may be 'hot swapped'.

The whole card may be protected from writing or erasing by setting the read-only flag as shown in section 9.3.9 9888 / 9777 - *Set / clear the SMARTCARD read only flag* on page 90.

Either of these indications will tell the user that data is being transferred to or from the SMARTCARD:

- SM-Keypad: The decimal point after the fourth digit in the upper display will flash.
- MP-Keypad: The symbol 'CC' will appear in the lower left hand corner of the display.

The card should not be removed during data transfer because the drive will trip. If a trip occurs you must either try to transfer the data again or, in the case of a card-to-drive transfer, the default parameters should be loaded.

### 9.3 Transferring data

When a code is entered into Pr **xx.00** and the drive is subsequently reset, the drive will carry out the actions listed in Table 9-2.

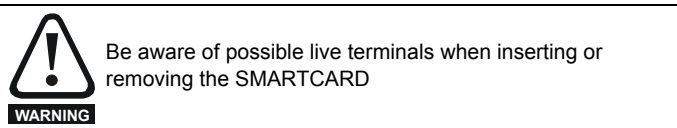
**Table 9-2 Transferring data**

Codes	Actions
Pr <b>x.00</b> = rAd 1	Transfer SMARTCARD data block 1 to the drive.
Pr <b>x.00</b> = rAd 2	Transfer SMARTCARD data block 2 to the drive.
Pr <b>x.00</b> = rAd 3	Transfer SMARTCARD data block 3 to the drive.
Pr <b>x.00</b> = PrOg 1	Transfer drive parameters as difference from default to SMARTCARD data block number 1.
Pr <b>x.00</b> = PrOg 2	Transfer drive parameters as difference from default to SMARTCARD data block number 2.
Pr <b>x.00</b> = PrOg 3	Transfer drive parameters as difference from default to SMARTCARD data block number 3.
Pr <b>x.00</b> = 2001	Transfer drive parameters as difference from defaults to a bootable SMARTCARD data block with block number 1. This will clear data block 1 on the card if it already exists.
Pr <b>x.00</b> = 3yyy	Transfer drive parameters to a SMARTCARD data block number yyy.
Pr <b>x.00</b> = 4yyy	Transfer drive data as difference from defaults to SMARTCARD data block number yyy.
Pr <b>x.00</b> = 5yyy	Transfer drive user program to SMARTCARD data block number yyy.
Pr <b>x.00</b> = 6yyy	Transfer SMARTCARD data block yyy to the drive.
Pr <b>x.00</b> = 7yyy	Erase SMARTCARD data block yyy.
Pr <b>x.00</b> = 8yyy	Compare drive parameters with data block yyy.
Pr <b>x.00</b> = 9555	Clear SMARTCARD warning suppression flag.
Pr <b>x.00</b> = 9666	Set SMARTCARD warning suppression flag.
Pr <b>x.00</b> = 9777	Clear SMARTCARD read-only flag.
Pr <b>x.00</b> = 9888	Set SMARTCARD read-only flag.
Pr <b>x.00</b> = 9999	Erase SMARTCARD.
Pr <b>11.42 (SE09, 0.30)</b> = Read	Transfer SMARTCARD data block 1 to the drive provided it is a parameter file.
Pr <b>11.42 (SE09, 0.30)</b> = Prog	Transfer drive parameters to a SMARTCARD data block number 1.
Pr <b>11.42 (SE09, 0.30)</b> = Auto	Transfer drive parameters to a SMARTCARD data block with data block number 1 provided.
Pr <b>11.42 (SE09, 0.30)</b> = boot	Pr <b>11.42 (SE09, 0.30)</b> has been changed since power-up.

Where yyy indicates the data block number 001 to 999, refer to Table 9-1 for restrictions on data block numbers.

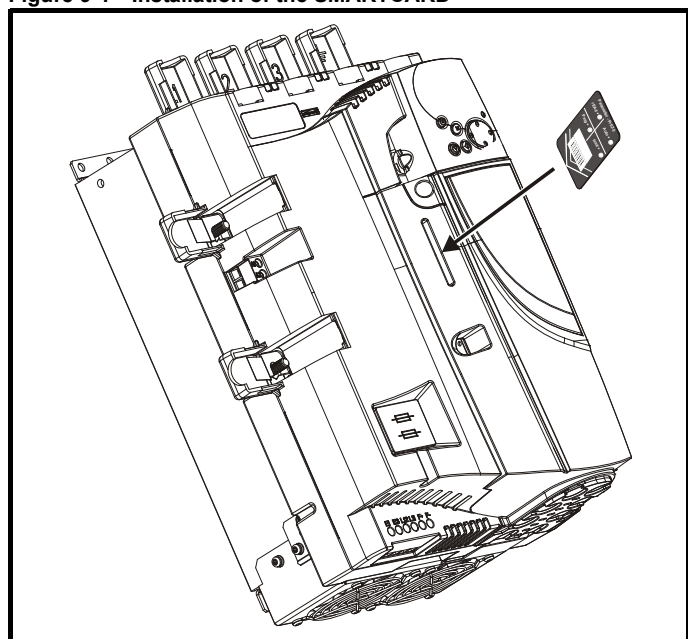
#### NOTE

If the read only flag is set then only codes 6yyy or 9777 are effective.



Be aware of possible live terminals when inserting or removing the SMARTCARD

**Figure 9-1 Installation of the SMARTCARD**



### 9.2 Easy saving and reading

The SMARTCARD has 999 individual data block locations. Each individual location from 1 to 499 can be used to store data.

The drive can support SMARTCARDS that have a capacity of between 4 kB and 512 kB.

The usage of the data block locations in the SMARTCARD are shown in Table 9-1.

**Table 9-1 SMARTCARD data blocks**

Data block	Type	Example of usage
1 to 499	Read / Write	Application set-up
500 to 999	Read Only	Macros

Parameter sets labelled as 'Differences from default' will be much smaller than whole parameter sets. Therefore they use a lot less memory because most applications only require a few parameters to be changed from the default setting.

### 9.3.1 Writing to the SMARTCARD

#### 3yyy - Transfer data to the SMARTCARD

The data block contains the complete parameter data from the drive, i.e. all user-save (US) parameters except parameters with the NC coding bit set. Power-down save (PS) parameters are not transferred to the SMARTCARD.

#### 4yyy - Write default differences to a SMARTCARD

The data block only contains the parameter differences from the last time default settings were loaded.

Six bytes are required for each parameter difference. The data density is not as high as when using the 3yyy transfer method as described in the section *3yyy - Transfer data to the SMARTCARD* but in most cases the number of differences from default is small and the data blocks are therefore smaller. This method can be used for creating drive macros. PS parameters are not transferred to the SMARTCARD.

#### Writing a parameter set to the SMARTCARD

Setting Pr 11.42 (SE09, 0.30) to Prog (2) and resetting the drive will save the parameters to the SMARTCARD, i.e. this is equivalent to writing 3001 to Pr xx.00. All SMARTCARD trips apply except 'C.Chg'. If the data block already exists it is automatically overwritten.

When the action is complete this parameter is automatically reset to nonE (0).

### 9.3.2 Reading from the SMARTCARD

#### 6yyy - Read default differences from a SMARTCARD

When the data is transferred back to a drive, using 6yyy in Pr xx.00, it is transferred to the drive RAM and the drive EEPROM. A parameter save is not required to retain the data after power-down. Set-up data for any Solutions Modules installed are stored on the card and are transferred to the destination drive. If the Solutions Modules are different between the source and destination drive, the menus for the slots where the Solutions Module categories are different are not updated from the card and will contain their default values after the copying action.

The drive will produce a 'C.Optn' trip if the Solutions Modules installed to the source and destination drive are different or are in different slots. If the data is being transferred to a drive of a different voltage or current rating a 'C.rtg' trip will occur.

Table 9-3 lists the rating dependent parameters (RA coding bit set) that will not be written to the destination drive and will contain their default values after the copying action.

**Table 9-3 Rating dependent parameters**

Parameter	Function
4.05	Current limit
4.06	Current limit
4.07	Current limit
4.24	User current maximum scaling
5.07 (SE07, 0.28)	Motor rated current
5.09 (SE06, 0.27)	Armature rated voltage

#### Reading a parameter set from the SMARTCARD

Setting Pr 11.42 (SE09, 0.30) to rEAd (1) and resetting the drive will transfer the parameters from the card into the drive parameter set and the drive EEPROM, i.e. this is equivalent to writing 6001 to Pr xx.00. All SMARTCARD trips apply. Once the parameters are successfully copied this parameter is automatically reset to nonE (0). Parameters are saved to the drive EEPROM after this action is complete.

#### NOTE

This operation is only performed if data block 1 on the card is a full parameter set (3yyy transfer) and not a default difference file (4yyy transfer). If data block 1 does not exist a 'C.dAt' trip occurs.

### 9.3.3 Auto saving parameter changes

This setting causes the drive to automatically save any changes made to Menu 0 parameters on the drive to the SMARTCARD. The latest Menu 0 parameter set in the drive is therefore always backed up on the SMARTCARD.

Changing Pr 11.42 (SE09, 0.30) to Auto (3) and resetting the drive will immediately save the complete parameter set from the drive to the card, i.e. all User Save (US) parameters except parameters with the NC coding bit set. Once the whole parameter set is stored only the individual modified menu 0 parameter setting is updated.

Advanced parameter changes are only saved to the card when Pr xx.00 is set to a 1000 and the drive reset.

All SMARTCARD trips apply, except 'C.Chg'. If the data block already contains information it is automatically overwritten.

If the card is removed when Pr 11.42 (SE09, 0.30) is set to 3, Pr 11.42 (SE09, 0.30) is then automatically set to nonE (0).

When a new SMARTCARD is installed Pr 11.42 (SE09, 0.30) must be set back to Auto (3) by the user and the drive reset so the complete parameter set is rewritten to the new SMARTCARD if auto mode is still required.

When Pr 11.42 (SE09, 0.30) is set to Auto (3) and the parameters in the drive are saved, the SMARTCARD is also updated, therefore the SMARTCARD becomes a copy of the drives stored configuration.

At power up, if Pr 11.42 (SE09, 0.30) is set to Auto (3), the drive will save the complete parameter set to the SMARTCARD. The drive will display 'cArd' during this operation. This is done to ensure that if a user puts a new SMARTCARD in during power down the new SMARTCARD will have the correct data.

#### NOTE

When Pr 11.42 (SE09, 0.30) is set to Auto (3) the setting of Pr 11.42 (SE09, 0.30) itself is saved to the drive EEPROM but NOT to the SMARTCARD.

### 9.3.4 Booting up from the SMARTCARD on every power up (Pr 11.42 (SE09, 0.30) = boot (4))

When Pr 11.42 (SE09, 0.30) is set to boot (4) the drive operates the same as Auto mode, except when the drive is powered up. The parameters on the SMARTCARD will be automatically transferred to the drive at power-up if the following are true:

- A card is inserted in the drive
- Parameter data block 1 exists on the card
- The data in block 1 is type 1 to 5 (as defined in Pr 11.38)
- Pr 11.42 (SE09, 0.30) on the card set to boot (4)

The drive will display 'boot' during this operation. If the drive mode is different from that on the card, the drive gives a 'C.Typ' trip and the data is not transferred.

If 'boot' mode is stored on the copying SMARTCARD this makes the copying SMARTCARD the master device. This provides a very fast and efficient way of re-programming a number of drives.

If data block 1 contains a bootable parameter set and data block 2 contains an Onboard PLC program (type 17 as defined in Pr 11.38), then the onboard PLC program will be transferred to the drive at power up along with the parameter set in data block 1.

#### NOTE

"Boot" mode is saved to the card, but when the card is read, the value of Pr 11.42 (SE09, 0.30) is not transferred to the drive.

### 9.3.5 Booting up from the SMARTCARD on every power up (Pr xx.00 = 2001)

It is possible to create a difference from default bootable file by setting Pr xx.00 to 2001 and resetting the drive. This type of file causes the drive to behave in the same way at power-up as a file created with boot mode set up with Pr 11.42 (SE09, 0.30). The difference from the default file is that it has the added advantage of including Menu 20 parameters.

Setting Pr xx.00 to 2001 will overwrite data block 1 on the card, if it already exists.

If a data block 2 exists and contains an Onboard PLC program (type 17 as defined in Pr 11.38), this will also be loaded after the parameters have been transferred.

A bootable difference from default file can only be created in one operation and parameters cannot be added as they are saved via Menu 0.

### 9.3.6 Comparing drive full parameter set with the SMARTCARD values

Setting 8yyy in Pr **xx.00**, will compare the SMARTCARD file with the data in the drive:

- If the compare is successful Pr **xx.00** is simply set to 0
- If the compare fails a 'C.cpr' trip is initiated

### 9.3.7 7yyy / 9999 - Erasing data from the SMARTCARD

Data can be erased from the SMARTCARD one data block at a time or with data blocks 1 to 499 in selected together.

- Setting 7yyy in Pr **xx.00** will erase SMARTCARD data block yyy
- Setting 9999 in Pr **xx.00** will erase SMARTCARD data blocks 1 to 499

### 9.3.8 9666 / 9555 - Set / clear SMARTCARD warning suppression flag

1. If the Solutions Module(s) installed to the source and destination drive are different, or are in different slots, the drive will produce a 'C.Optr' trip.
2. If the data is being transferred to a drive of a different voltage or current rating a 'C.rtg' trip will occur.

It is possible to suppress these trips by setting the warning suppression flag. If this flag is set the drive will not trip if the Solutions Module(s) or drive ratings are different between the source and the destination drives. The Solutions Module or rating dependent parameters will not be transferred.

- Setting 9666 in Pr **xx.00** will set the warning suppression flag
- Setting 9555 in Pr **xx.00** will clear the warning suppression flag

### 9.3.9 9888 / 9777 - Set / clear the SMARTCARD read only flag

The SMARTCARD may be protected from writing or erasing by setting the read only flag. If an attempt is made to write or erase a data block when the read only flag is set, a 'C.Rdo' trip is initiated.

When the read only flag is set only codes 6yyy or 9777 are effective.

- Setting 9888 in Pr **xx.00** will set the read only flag
- Setting 9777 in Pr **xx.00** will clear the read only flag

## 9.4 Data block header information

Each data block stored on a SMARTCARD has header information detailing the following:

- A number which identifies the data block (Pr **11.37**)
- Type of data stored in the data block (Pr **11.38**)
- Drive mode if the data is parameter data (Pr **11.38**)
- Version number (Pr **11.39**)
- Checksum (Pr **11.40**)
- Read-only flag
- Warning suppression flag

The header information for each data block that has been used can be viewed in Pr **11.38** to Pr **11.40** by increasing or decreasing the data block number set in Pr **11.37**.

If Pr **11.37** is set to 1000: the checksum parameter (Pr **11.40**) shows the number of bytes left on the card in 16 byte pages.

If Pr **11.37** is set to 1001: the checksum parameter (Pr **11.40**) shows the total capacity of the card in 16 byte pages. Therefore, for a 4kB card this parameter would show 254.

If Pr **11.37** is set to 1002: the checksum parameter (Pr **11.40**) shows the state of the read-only (bit 0) and warning suppression flags (bit 1).

If there is no data on the card: Pr **11.37** can only have values of 0 or 1000 to 1002.

## 9.5 SMARTCARD parameters

11.36		SMARTCARD parameter data previously loaded											
RO	Uni	NC								PT	US		
↕	0 to 999							⇒	0				

This parameter shows the number of the data block last parameter or difference from default data block transferred from a SMARTCARD to the drive.

11.37		SMARTCARD data number											
RW	Uni	NC											
↕	0 to 1002							⇒	0				

This parameter shows the data blocks that are stored on a SMARTCARD with header information, including a number to identify the data block.

11.38		SMARTCARD data type/mode											
RO	Txt	NC								PT			
↕	0 to 18							⇒					

This parameter gives the type/mode of the data block selected with Pr **11.37** as shown in the following table.

**Table 9-4 Pr 11.38 types and modes**

Pr 11.38	String	Type/Mode
0	FrEE	Value when Pr <b>11.37</b> = 0
1	3C.SE	Commander SE mode parameter file (not used)
2	3OpEn.LP	Open-loop mode parameter file
3	3CL.VEct	Closed-loop vector mode parameter file
4	3SErVO	Servo mode parameter file
5	3REGEn	Regen mode parameter file
6	3DC	DC mode parameter file
7	3Un	Unused
8	3Un	Unused
9	4C.SE	Commander SE mode difference from default file (not used)
10	4OpEn.LP	Open-loop mode difference from default file
11	4CL.VEct	Closed-loop vector mode difference from default file
12	4SErVO	Servo mode difference from default file
13	4REGEn	Regen mode difference from default file
14	4DC	DC Mode difference from default file
15 & 16	4Un	Unused
17	LAddEr	Onboard Application Lite user program file
18	Option	A file containing user defined data (the file is normally created by an SM-Applications Solutions Module)
19	OptPrg	A file containing user defined data (normally created by an SM-Applications Solutions Module user program (Digitax ST only))

11.39		SMARTCARD data version											
RW	Uni	NC											
↕	0 to 9999							⇒	0				

This parameter gives the version number of the data block.

<b>11.40</b>		<b>SMARTCARD data checksum</b>											
RO	Uni	NC										PT	
↕	0 to 65335						⇒	0					

This parameter gives the checksum of the data block, space left on the card, the total space on the card or the card flags. Refer to Pr 11.37 for information.

<b>11.42 (SE09, 0.30)</b>		<b>Parameter copying</b>											
RW	Txt	NC											US*
↕	0 to 4						⇒	0					

\* Mode 1 and Mode 2 are not saved when the drive parameters are saved. This parameter can only be saved to EEPROM if it has a value of 0, 3 or 4.

**Table 9-5 Pr 11.42 actions**

Actions	Value	Result
None	0	Inactive
Reading	1	Read parameter set from SMARTCARD
Programming	2	Program parameter set to the SMARTCARD
Auto	3	Auto save
Boot	4	Boot mode

**NOTE**

## 9.6 SMARTCARD trips

After an attempt to read, write or erase data to or from a SMARTCARD a trip may occur if there has been a problem with the command. Table 9-6 lists the trip indications and conditions that will cause the SMARTCARD to trip,

**Table 9-6 Trip conditions**

Trip	Condition
<b>C.boot</b>	<b>SMARTCARD trip: The menu 0 parameter modification cannot be saved to the SMARTCARD because the necessary file has not been created on the SMARTCARD</b>
177	A write to a Menu 0 parameter has been initiated with the keypad by exiting edit mode and Pr 11.42 (SE09, 0.30) is set for auto or boot mode. However the necessary boot file has not been created on the SMARTCARD to take the new parameter value. This occurs when Pr 11.42 (SE09, 0.30) is changed to auto or boot mode, but the drive is not subsequently reset.
<b>C.BUSy</b>	<b>SMARTCARD trip: SMARTCARD can not perform the required function as it is being accessed by a Solutions Module</b>
178	An attempt has been made to access a SMARTCARD. However an Solutions Module is already accessing the SMARTCARD.
<b>C.Chg</b>	<b>SMARTCARD trip: Data location already contains data</b>
179	An attempt has been made to store data in a SMARTCARD data block that already exists.
<b>C.Optn</b>	<b>SMARTCARD trip: Solutions Modules installed are different between source drive and destination drive</b>
180	Parameter data or default difference data is being transferred from a SMARTCARD to the drive, but the Solutions Module categories are different between source and destination drives. This trip does not stop the data transfer, but is a warning that the data for the Solutions Modules that are different will be set to the default values and not the values from the card. This trip also applies if a compare is attempted between the data block and the drive.
<b>C.Rdo</b>	<b>SMARTCARD trip: SMARTCARD has the Read Only bit set</b>
181	An attempt has been made to modify a read-only SMARTCARD (i.e. erase the card, erase a file or create a file). A SMARTCARD is read-only if the read-only flag has been set or the card contains data blocks with numbers from 500 to 999. Attempting to create data blocks with numbers from 500 to 999 will always cause a trip.
<b>C.Err</b>	<b>SMARTCARD trip: SMARTCARD data is corrupted</b>
182	An attempt has been made to transfer a data block from a SMARTCARD to the drive or to compare a SMARTCARD data block and the checksum is incorrect or the data structure on the card is incorrect.
<b>C.dat</b>	<b>SMARTCARD trip: Data location specified does not contain any data</b>
183	An attempt has been made to transfer a data block from a SMARTCARD to the drive or to compare a SMARTCARD data block and the block does not exist.
<b>C.FULL</b>	<b>SMARTCARD trip: SMARTCARD full</b>
184	An attempt has been made to create a data block on a SMARTCARD, but there is not enough space on the card.
<b>C.Acc</b>	<b>SMARTCARD trip: SMARTCARD Read / Write fail</b>
185	An attempt has been made to access a SMARTCARD, but a card is not present or communications failure has occurred between the drive and the card. This trip is also produced if an attempt is made to access a data block that has already been opened by an Solutions Module.
<b>C.rtg</b>	<b>SMARTCARD trip: The voltage and/or current rating of the source and destination drives are different</b>
186	Parameter data or default difference data is being transferred from a SMARTCARD to the drive, but the current and /or voltage ratings are different between source and destination drives. This trip does not stop the data transfer, but is a warning that the data for the Solutions Modules that are different will be set to the default values and not the values from the card. This trip also applies if a compare is attempted between the data block and the drive.

Trip	Condition
<b>C.Typ</b>	<b>SMARTCARD trip: SMARTCARD parameter set not compatible with drive</b>
187	This trip is produced during a compare if the drive mode in the data block is different from the current drive mode and the file is a parameter or defaults differences file. This trip is also produced if an attempt is made to transfer parameters from a parameter or default difference to the drive if the drive mode in the data block is outside the allowed range of drive modes for the drive.
<b>C.cpr</b>	<b>SMARTCARD trip: The values stored in the drive and the values in the data block on the SMARTCARD are different</b>
188	A compare has been carried out between a data block on a SMARTCARD and the drive and the compare has failed. This trip only occurs if the compare has not already failed with the following trips: C.Typ, C.rtg, C.Optn, C.BUSy, C.Acc or C.Err.

**Table 9-7 SMARTCARD status indications**

Lower display	Description
<b>boot</b>	A parameter set is being transferred from the SMARTCARD to the drive during power-up. For further information please refer to <i>section 9.3.4 Booting up from the SMARTCARD on every power up (Pr 11.42 (SE09, 0.30) = boot (4))</i> on page 89.
<b>cArd</b>	The drive is writing a parameter set to the SMARTCARD during power-up. For further information please refer to <i>section 9.3.3 Auto saving parameter changes</i> on page 89.