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1. HISTORY

Version	Date	Description
26	14/06/2012	Add IDN S-0-0033 and S-0-0103 Add IDN for position window: S-0-0057; S-0-0336; S-0-0261; S-0-0341 Add IND for real time bits: S-0-1050.0.20; S-0-1050.1.20; S-0-1050.0.21; S-0-1050.1.21; S-0-0398; S-0-0399
25	14/05/2012	Add IDN S-0-0310
24	10/05/2012	Add backup, deployment and update features.
23	04/04/2012	Add support for C2D
22	26/03/2012	Add homing IDNs
21	30/01/2012	Add a manufactured class 1 diagnostic bit 2 S-0-0129
20	12/01/2012	Add exhaustive IDN list as appendix.
19	06/12/2011	Updated *Payload* chapter.
18	02/02/2011	Corrections in ESTOP acknowledgement paragraph. Re mane ESTOP acknowledgement in ESTOP fault acknowledgement.
17	01/02/2011	New ESTOP acknowledgement
16	11/01/2011	Add ESTOP Acknowledgement
15	10/01/2011	Add records
14	16/12/2010	Split in 2 documents SERCOS III and SoE
13	03/12/2010	Add IP settings
12	25/11/2010	Add axis name.
11	05/11/2010	Add serial numbers.
10	21/10/2010	Add payload inertia.
9	15/09/2010	Add SERCOS addresses IDN.
8	21/07/2010	Add IO Function Groups
7	24/06/2010	Add Electronic Label (S-0-1300)
6	14/06/2010	Adjust definition of torque data size. Add SCARA idns
5	19/05/2010	Add SoE (Sercos Over EtherCat) support Rename superDrive to uniVAL
4	18/02/2010	Add IDN S-0-0189: following distance. Add references to sercos documents. Additional IDNs for polarity, homing.
3	02/02/2010	Remove some TODO
2	23/11/2009	More IDN supported.
1	28/09/2009	Initial version for prototype.

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2. REFERENCE

This document refers to the following SERCOS specifications documents:

- Description of identification numbers_V1.1.2.1.2.pdf
- Function specific Profile Drives_V1.1.2.2.13.pdf
- Function Specific Profile IO V1.1.2.1.4.pdf

3. INTRODUCTION

All needed IDN in the following SERCOS III profiles are supported:

- Communication
- Generic
- Drive

Please refer to the appendix for the list of all supported IDN.

TODO	The feature is not implemented in the current version. The implementation will be done later.
NS	The feature is not supported. The Implementation can be consider upon demands.
NA	The feature in not applicable to uniVAL.

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4. SYNCHRONOUS DATAS

4.1. Connection 0: MDT Drive consumer

4.1.1. S-0-1050.0.01: Configuration

Bits	Value	Description
15	1	Slave shall use this connection
14	0	Consumer
13-12	00	Master
11-6	X	Reserved
5-4	00	Variable configuration of IDNs with S-0-1050.x.6
3	0	Producer cycle synchronous
2	X	Reserved
1-0	00	Producer cycle synchronous operation

4.1.2. S-0-1050.0.06: Configuration list

Refer to S-0-0188 for supported IDNs.

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4.1.3. S-0-0134: Drive control

Bits	Value	Description
15	0/1	Drive OFF/ON
14	0/1	Drive ENABLE
13	0/1	Drive HALT
12	X	Reserved
11	0	Reserved
10-8	000	Primary operation mode (S-0-0032) (must be 000)
7-0	X	Reserved

4.1.4. S-0-0047: Position command value

4.1.5. S-0-0036: Velocity command value

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4.2. Connection 1: AT Drive producer

4.2.1. S-0-1050.1.01: Configuration

Bits	Value	Description
15	1	Slave shall use this connection
14	1	Producer
13-12	00	Master
11-6	X	Reserved
5-4	00	Variable configuration of IDNs with S-0-1050.x.6
3	0	Producer cycle synchronous
2	X	Reserved
1-0	00	Producer cycle synchronous operation

4.2.2. S-0-1050.1.06: Configuration list

Refer to S-0-0187 for supported IDNs.

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4.2.3. S-0-0135: Drive status

Bits	Value	Description
15-14	00/01/10/11	Ready to operate
13	0/1	Drive shut-down error in C1D (S-0-0011)
12	0/1	Warning in C2D (S-0-0012)
11	0	Reserved
10-8	000	Primary operation mode
7	0	Reserved
6	0	Reserved
5	0/1	Position feedback value status (S-0-0403)
4	0/1	Drive halt (S-0-0124)
3	0/1	Status command value processing
2-0	X	Reserved

4.2.4. S-0-0051: Position feedback

4.2.5. S-0-0040: Velocity feedback

4.2.6. S-0-0084: Torque feedback

4.2.7. S-0-0189: Following distance

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5. CONFIGURATION DATAS

5.1. S-0-0015: Telegram type

Bits	Value	Description
15-12	X	Reserved
11-10	01	Length of AT service channel: CP3/4 sercosIII
9-8	01	Length of MDT service channel: CP3/4 sercosIII
7-5	X	Reserved
4	0	Feedback value: configured position feedback value
3	0	Position feedback value: Position feedback value 1 (S-0-0051)
2-0	111	Application telegram uses S-0-1050
	Other values	(NS)

Read only.

5.2. S-0-0292: List of supported operation modes

Only mode "*synchronous operation with position control using position feedback1*" is supported.

According to table 20 in the Sercos specification:

Bits	Value	Description
15	0	Sercos operation mode
14-10	X	Reserved
9	0	Without axis contol word
8	0	Without transition support
7-4	0000	Expended operation mode
3	1	Without following error
2-0	011	Operation mode: synchronous operation with position control using position feedback1

Read only.

So only one entry in the list with the value: 0x000B

5.3. S-0-0032: Primary operation mode

Primary operation mode is "*synchronous operation with position control using position feedback1*". Refer to S-0-292 (paragraph 5.2).

So this IDN is fixed to 0x000B.

5.4. S-0-0033: Secondary operation mode

Same value as S-0-0032.

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5.5. S-0-0011: C1D Class 1 diagnostic

Bits	Value	Description
15	0/1	Manufacturer-specific error
14	x	Reserved
13	0/1	Over travel limit is exceeded shut-down (S-0-0049; S-0-0050)
12	X	Reserved
11	0/1	Excessive position deviation (S-0-0159) (S-0-0391 is not supported.)
10	0/1	Power supply phase error.
9	0/1	Under voltage (only CS8C, not supported on CS8)
8	0/1	Over voltage (only CS8C, not supported on CS8)
7	0/1	Over current (only CS8C, not supported on CS8)
6	0	Error in commutation system
5	0/1	Feedback error
4	0/1	Control voltage error
3	0 (NS)	Cooling error shut-down (S-0-0205)
2	0 (NS)	Motor over temperature shut-down (S-0-0204)
1	0/1	Amplifier over temperature shut-down (S-0-0203 not supported)
0	0 (NS)	Overload shut-down (S-0-0114)

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5.6. S-0-0012: C2D Class 2 diagnostic

Bits	Value	Description
15	0 (NS)	Manufacturer-specific warning (S-0-0181)
13-14	X	Reserved
12	0 (NS)	Communication warning
11	0 (NS)	Excessive velocity deviation (S-0-0377)
10	X	Reserved
9	0 (NS)	Under voltage warning (bus voltage)
4-8	0	Reserved
3	0 (NS)	cooling error warning see S-0-0313
2	0 (NS)	motor over temperature warning see S-0-0312
1	0 (NS)	amplifier over temperature warning see S-0-0311
0	0/1	Overload of the amplifier, motor or power supply. see S-0-0310 (only CS8C, not supported on CS8)

5.7. S-0-0310: Overload warning

Bits	Value	Description
15-1	X	Reserved
0	0/1	0: no overload warning 1: overload warning

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5.8. S-0-0189: Following distance

This IDN will return the following distance of the axis.

5.9. S-0-0429: Emergency stop deceleration

Not applicable: the emergency stop deceleration should be managed by the master. The uniVAL behaves as a redundant second level with power off, motors active braking and brakes engagement.

5.10. S-0-0017: List off all operational data

This IDN returns the list of all operational data available.

5.11. S-0-0021 List of invalid operation data for CP2

5.12. S-0-0022 List of invalid operation data for CP3

5.13. S-0-0187 IDN-List of configurable data as producer

5.14. S-0-0188 IDN-List of configurable data as consumer

5.15. S-0-0124 Standstill window

Set to 0.

5.16. S-0-0055 Position polarity parameter.

Set to 0x0010. All positive and position limit values enabled.

5.17. S-0-0049 Positive position limit value

5.18. S-0-0050 Negative position limit value

5.19. S-0-0043 Velocity polarity parameter.

Set to 0. (All positive).

5.20. S-0-0085 Torque polarity parameter.

Set to 0. (All positive).

5.21. S-0-0103 Modulo value

Set to 0 not used by uniVAL.

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6. DATA SCALING

We consider operation data at the output of gears, so data reference is "At load". By the way, gear ratios are set to one.

6.1. Mechanical parameters

6.1.1. S-0-0121 Input revolutions of load gear

Set to 1.

6.1.2. S-0-0122 Output revolutions of load gear

Set to 1.

6.1.3. S-0-0123 Feed constant

Set to 1.

6.2. Rotational position

6.2.1. S-0-0076: Position data scaling type

Bits	Value	Description
15-8	X	Reserved
7	0	Processing format: absolute
6	1	Data reference: At the load
5	X	Reserved
4	0	Unit for rotational scaling: degrees
3	1	Parameter scaling (S-0-0079)
2-0	010	Scaling method: rotational

6.2.2. S-0-0079: Rotational position resolution

This value is computed by the uniVAL.

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6.3. Linear position (linear axis of SCARA robot)

6.3.1. S-0-0076: position data scaling type

Bits	Value	Description
15-8	X	Reserved
7	0	Processing format: absolute
6	1	Data reference: At the load
5	X	Reserved
4	0	Unit for linear scaling: meters
3	1	Parameter scaling (S-0-0077; S-0-0078)
2-0	001	Scaling method: linear

6.3.2. S-0-0077: Linear position data scaling factor

Set to 1.

6.3.3. S-0-0078: Linear position data scaling exponent

Bits	Value	Description
15	1	Sign of the exponent: negative.
14-0	computed by the uniVAL	Exponent.

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6.4. Rotational velocity

6.4.1. S-0-0044: velocity data scaling type

Bits	Value	Description
15-7	X	Reserved
6	1	Data reference: At the load
5	1	Time unit: seconds
4	0	Unit for rotational scaling: rev
3	1	Parameter scaling (S-0-0045; S-0-0046)
2-0	010	Rotational scaling

6.4.2. S-0-0045: velocity data scaling factor

Set to 1.

6.4.3. S-0-0046: velocity data scaling exponent

Bits	Value	Description
15	1	Sign of the exponent: negative
14-0	computed by the uniVAL	Exponent

6.5. Linear velocity (linear axis of SCARA robot)

6.5.1. S-0-0044: velocity data scaling type

Bits	Value	Description
15-7	X	Reserved
6	1	Data reference: At the load
5	1	Time unit: seconds
4	0	Unit for rotational scaling: meters
3	1	Parameter scaling (S-0-0045; S-0-0046)
2-0	001	Linear scaling

6.5.2. S-0-0045: velocity data scaling factor

Set to 1.

6.5.3. S-0-0046: velocity data scaling exponent

Bits	Value	Description
15	1	Sign of the exponent: negative
14-0	computed by the uniVAL	Exponent

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6.6. Torque

6.6.1. S-0-0086: Torque data scaling type

Bits	Value	Description
15-9	X	Reserved
8	0	Selection of data length: 2 bytes
7	X	Reserved
6	1	Data reference: At the load
5	X	Reserved
4	0	Unit for torque: Nm
3	0	Preferred scaling.
2-0	010	Scaling method: torque

6.6.2. S-0-0093: Torque data scaling factor

Set to 1.

6.6.3. S-0-0094: Torque data scaling exponent

Bits	Value	Description
15	1	Sign of the exponent: negative
14-0	2	Exponent

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6.7. Force (linear axis of SCARA robot)

6.7.1. S-0-0086: Force data scaling type

Bits	Value	Description
15-9	X	Reserved
8	0	Selection of data length: 2 bytes
7	X	Reserved
6	1	Data reference: At the load
5	X	Reserved
4	0	Unit for torque: N
3	0	Preferred scaling.
2-0	001	Scaling method: force

6.7.2. S-0-0093: Force data scaling factor

Set to 1.

6.7.3. S-0-0094: Force data scaling exponent

Bits	Value	Description
15	1	Sign of the exponent: negative
14-0	0	Exponent

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7. HOMING

7.1. S-0-0403 Position feedback value status

Bits	Value	Description
15-3	X	Reserved
2	0	Status of position feedback value2 Not used, only position feedback value 1 is used (cf S-0-0015).
1	0/1	Status of position feedback value1 0: not referenced to machine zero point 1: referenced to machine zero point
0	0/1	Status of activated position feedback value. 0: not referenced to machine zero point 1: referenced to machine zero point

Bit 0 and 1 have the same value.

1 when the robot axis is calibrated.

0 when the robot axis is not calibrated.

7.2. S-0-0447 Set absolute position procedure command

After activation of the “Set absolute position procedure command” the drive

- ignores the command value from the control unit,
- evaluates the Set absolute position control (S-0-0448),
- calculates the difference between the position feedback value 1 or 2 (S-0-0051) and the Reference Distance 1 (S-0-0052),
- stores the calculated difference in the Displacement Parameter 1 (S-0-0175).

The positive acknowledgment is generated if

- the displacement value is transferred in the position feedback value (the drive checks whether it can immediately transfer the displacement value or not),
- the position feedback value status (S-0-0403) reflects that homing has been completed once.

The procedure command will terminate with a fault, when the drive detects an error during the procedure command specific calculations.

7.3. S-0-0052 Reference distance 1

For absolute homing the reference distance 1 is the absolute position of the axis upon completion of the homing sequence with procedure command S-0-0447.

7.4. S-0-0175 Displacement parameter 1

When the procedure command “Set absolute position” (S-0-0447) is active, the drive calculate1s the difference between the old position feedback value and the new position feedback value. The drive stores the difference as the "displacement Parameter 1"

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7.5. S-0-0448 Set absolute position control word

The control word specifies which encoder is referenced by the set absolute position procedure command (S-0-0447). Encoder 1, encoder 2 or both.

A drive may or may not support setting the absolute position while it is enabled. The control unit can verify if the drive supports set absolute position with or without the drive enabled. In the case that bit 2 is set to “1” by the control unit, and the drive responses with an error, it does not support set absolute position while enabled.

Bits	Value	Description
15-3	X	Reserved
2	0	absolute homing mode in the drive 0: the control unit requests the drive to support absolute homing “without drive enabled” 1: the control unit requests the drive to support absolute homing “with drive enabled”
1	0	encoder 2 (external encoder) 0: not selected 1: selected for absolute homing
0	1	encoder 1 (motor encoder) 0: not selected 1: selected for absolute homing

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8. PAYLOAD

8.1. P-0-0001

This parameter defines the payload inertia for a specified axis, by a list of 13 floats:

Float	Description
1	Mass (kg)
2-4	Center of gravity: x,y,z (m) centered to the axis base, where the x, y and z directions when the robot is at its zero position match the 'world' x, y and z directions. [x y z] = [2 3 4]
5-13	Inertia matrix (kg.m²) centred to the center of gravity where the x, y and z directions when the robot is at its zero position match the 'world' x, y and z directions. |05 00 01| |00 05 00| |01 00 00| The inertia matrix shall be symmetrical.

WARNING: for the last axis, the flange is used instead of the axis base.

The payload can be specified with product IDN P-0-0001 on each axis. For example:

- In order to define a payload at the flange of a TX, P-0-0001 of device number 5 (robot axis 6) must be written.
- In order to declare a payload on the forearm of a TX, P-0-0001 of device number 3 (robot axis 4) must be written.

The payload can be changed while the robot arm is powered on. However, in this case, it is not allowed to change again the payload immediately after changing it. If the application performs two P-0-0001 writes close from each other (in less than approximately 100ms to 200ms, depending of the robot), the second write will fail.

9. RECORDS

9.1. P-0-0002: Initialize the record

This procedure command reads the configuration of the record from a file.

9.2. P-0-0003: Start the record

This procedure command starts the record if the initialization has been done.
The procedure is still executing until the record is full or if this procedure is cancelled.

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9.3. P-0-0004: Store the record

This procedure command stores the last record done by the procedure command P-0-0003 in a file.

9.4. P-0-0005: Clear the records

This procedure command clears all record files.

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10. BACKUP, DEPLOYEMENT AND UPDATE FEATURES

uniVAL provides functions to implement three main scenarios:

- Backup/restore: make a complete robot controller backup to be able to restore the system in a previous known good configuration.
- Deploy: build an archive that can be used to deploy the configuration of a system to other robot controllers.
- Update system firmware.

10.1. P-0-0010: Operation status

IDN data format : 2 octets unsigned integer value.

IDN data access mode : read-only.

This value gives information about the success or the failure of the last backup, deployment or update operation.

Value	Description
0	Operation successful.
1	Device requires complete re-initialization in order to complete the operation. In practice, this is done by rebooting the Stäubli robot controller.
2	Operation is in progress
3	Operation aborted.
10	Operation failed for unknown reason. Please refer to the controller log file for more information.
11	Operation failed : archive path is invalid or archive file cannot be opened.
12	Operation failed : internal error.
13	Operation failed : the specified archive is not a Stäubli robot controller backup file.
14	Operation failed : the two archives specified in P-0-15 and P-0-16 are not compatible. They cannot be used together. Please refer to the controller log file for more information.
15	Operation failed : an error occurred while writing archive file (file system may be full).

10.2. P-0-0011: Build a complete image of a robot controller

This procedure command builds a complete image of a robot controller (system firmware, system configuration, licenses, user preferences). This image can be used later to restore the system in a previous configuration.

The full system image contains system-specific configuration data (licenses, arm calibration…). Thus, a system image shall be restored only on the system that was used to make the backup.

This operation produces two files: one is a snapshot of the controller configuration and one contains controller firmware.

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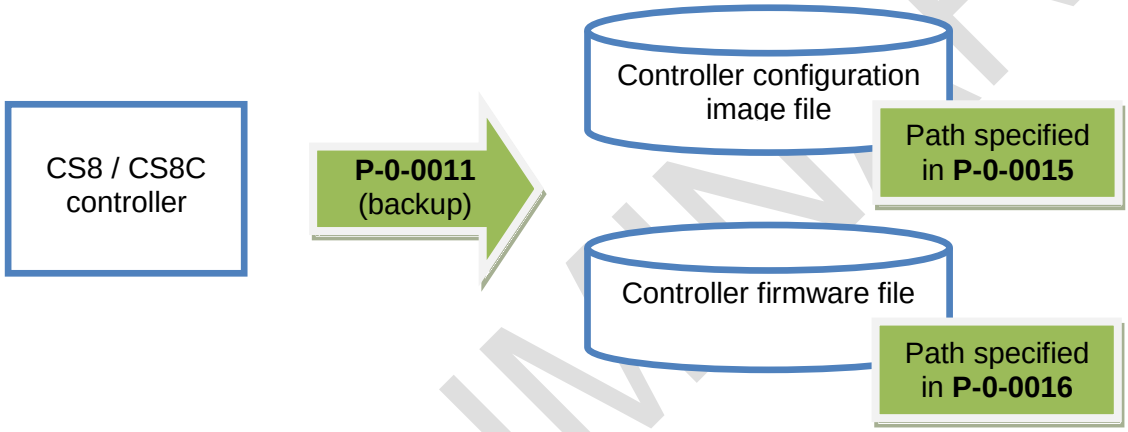
To build a system image :

- Store the target path for the system configuration image in IDN P-0-0015 (*configuration archive path*).
- Store the target path for the system firmware image in IDN P-0-0016 (*firmware archive path*).
- Execute the procedure command P-0-0011. The execution of this command may take between 60 and 180 seconds depending on the CPU speed and the volume of data to be backuped.
- Read procedure command status in P-0-0010 (*operation status*).
  - If status is “0”, operation was successful.



To restore the image:

- Store the target path for the system configuration image in IDN P-0-0015 (*configuration archive path*).
- Store the target path for the system firmware image in IDN P-0-0016 (*firmware archive path*).
- Execute the procedure command P-0-0013.
- Read procedure command status in P-0-0010.
  - If status is “1”, reboot the controller to take configuration changes into account.

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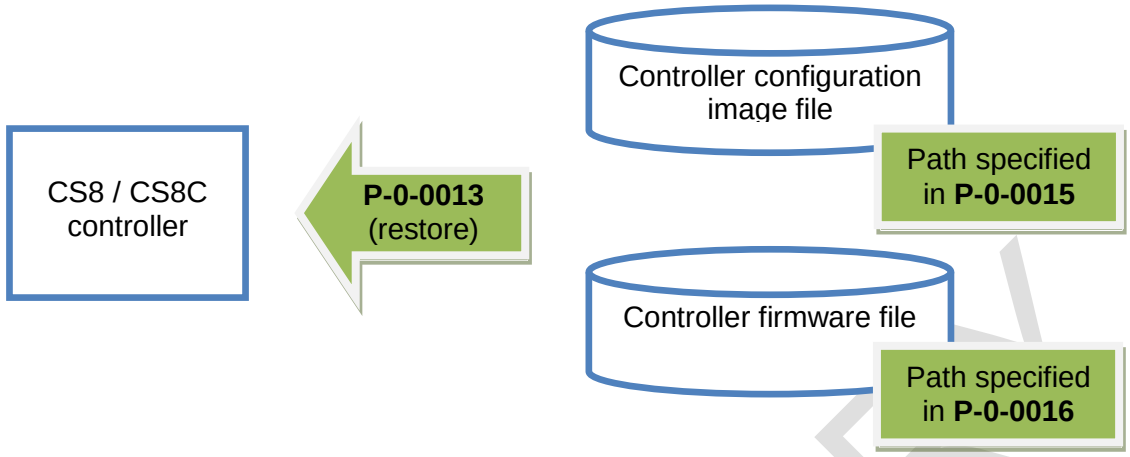

10.3. P-0-0012: Build configuration archive for deployment

This procedure command builds an archive that can be used to replicate a system configuration to other robot controllers.
This archive contains neither system-specific configuration files nor system firmware files.

This operation produces a file that is a partial snapshot of the controller configuration[1].

To build an archive for deployment :

- Store the target archive path in IDN P-0-0015 (*configuration archive path*).
- IDN P-0-0016 will be ignored.
- Execute the procedure command P-0-0012. This may take several seconds to execute.
- Read procedure command status in P-0-0010.

To deploy system configuration:

- Store the source archive path in IDN P-0-0015 (*configuration archive path*).
- Store an empty string in IDN P-0-0016 (*firmware archive path*).
- Execute the procedure command P-0-0013. This command will:
  - Read data from *configuration archive path* and reconfigure the system.
- Read procedure command status in P-0-0010.
  - If status is “1”, please reboot the robot controller to take configuration changes into account.

System firmware can be deployed along with the system configuration:

- Store the path to the source archive in IDN P-0-0015 (*configuration archive path*).
- Store the path to an official Stäubli Firmware archive in IDN P-0-0016 (*firmware archive path*).

[1] Same as the one that P-0-0011 produces, minus arm-specific configuration (arm.cfx) and licences and low-level configuration (controller.cfx).

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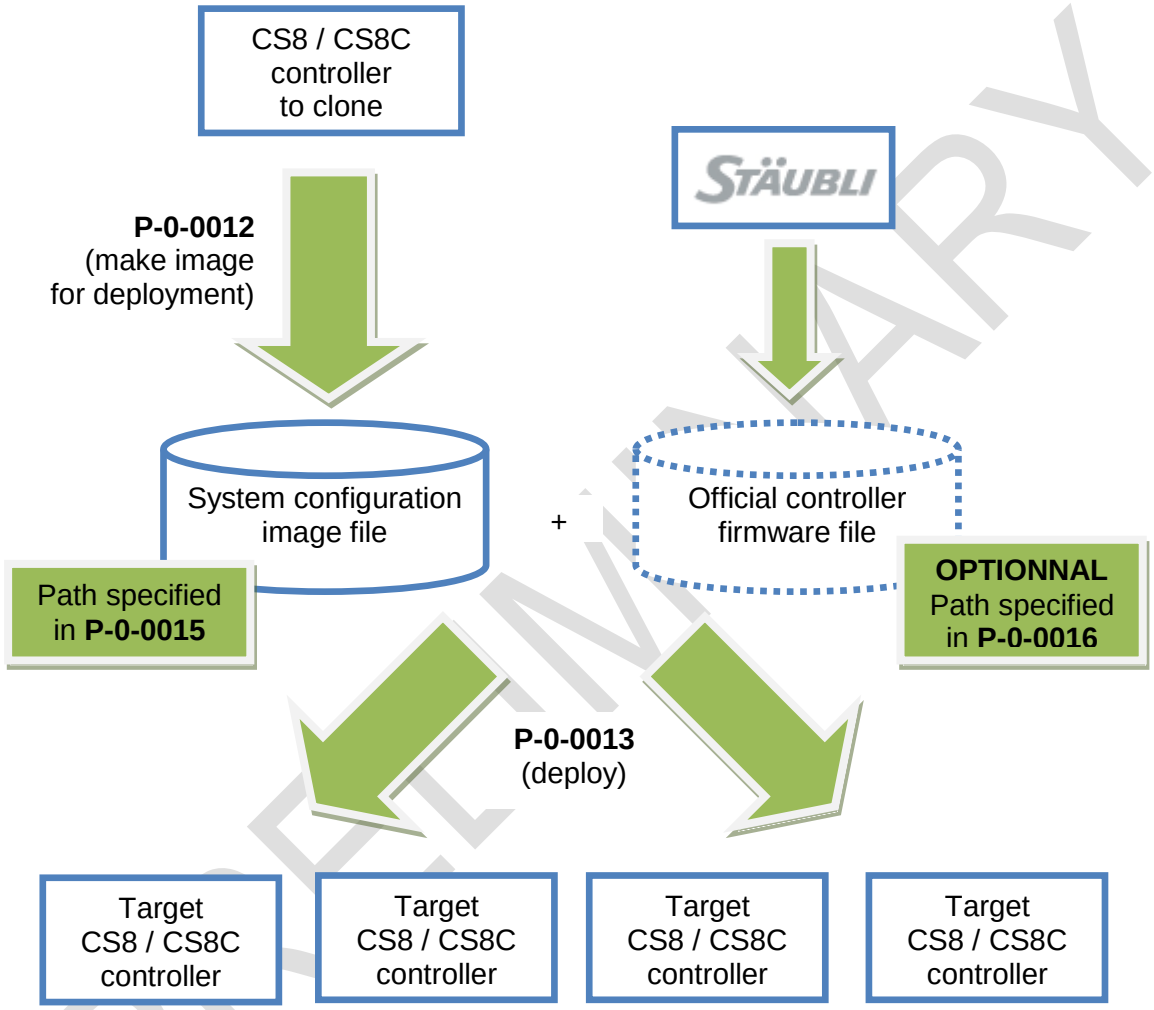
- Execute the procedure command P-0-0013. This command will:
  - Upgrade system firmware from *firmware archive path*.
  - Read data from *configuration archive path* and reconfigure the system.
- Read procedure command status in P-0-0010.
  - If status is “1”, reboot the controller to take configuration changes into account.



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10.4. P-0-0013: Restore image / deploy

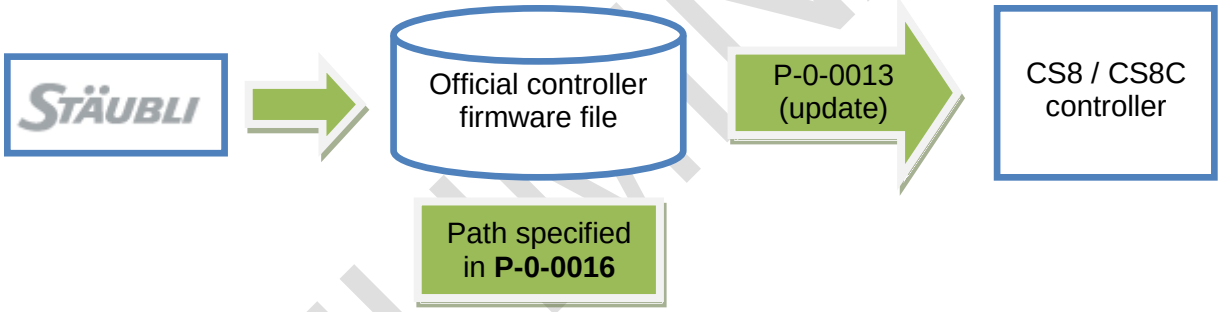
Use this procedure command to restore or deploy system images.
See description of P-0-0011 and P-0-0012 for more information.

10.5. P-0-0014: Update system firmware

Use this IDN to upgrade system firmware.

To upgrade:

- Store the path to the Stäubli Firmware archive in IDN P-0-0016 (*firmware archive path*).
- IDN P-0-0015 (*configuration archive path*) will be ignored.
- Execute the procedure command P-0-0013. This command will:
  - Upgrade system firmware from *firmware archive path*.
- Read procedure command status in P-0-0010.
  - If status is “1”, please reboot the robot controller to take configuration changes into account.



10.6. P-0-0015: Configuration archive path

Use this IDN to specify the path that will be used by the backup and restore operations.

IDN data format: Text (1 octet list)
IDN data syntax: The path shall comply with the following format: [FILESYSTEM]://[PATH]
IDN data access mode : Read/write.

Where:

- [FILESYSTEM] is any user-accessible file system mounted on the controller.
  - It can be either **Disk** (i.e. /usr/usrapp), USB keys or any other user-defined file system such as FTP mounts.
  - Please note that [FILESYSTEM] is case-sensitive.
- [PATH] is valid path to a file.

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Examples:

Disk://my_backup.sbf

ftpserver08://backups/2012/05/abcd-xyz-1234.sbf

10.7. P-0-0016: Firmware archive path

IDN data format:	same as P-0-0015.
IDN data syntax:	same as P-0-0015.
IDN data access mode :	same as P-0-0015.

11. DIAGNOSTIC

11.1. S-0-0095 diagnostic message

11.2. S-0-0390 diagnostic number

11.3. S-0-1303.0.10 diagnostic trace buffer 1

11.4. S-0-1303.0.11 diagnostic trace buffer 2

11.5. S-0-1303.0.02 diagnostic trace control

The trace buffers are enabled by default after system start. The master is able to influence the trace process (enable, disable, set threshold) by writing the IDN/S-0-1303.0.02 Diagnostic trace control.

11.6. S-0-0099: Reset class 1 diagnostic

When the robot controller detects a problem following action are performed:

- the robot is stopped and power is disabled
- drive shutdown error bit is set (S-0-0135 bit 13)
- C1D is sets (S-0-0011).

In order to restart the robot, the error must be cleared with procedure command S-0-0099 on each drive in error.

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12. SERCOS ADDRESSES

12.1. S-0-1040 SERCOS address

This parameter contains the SERCOS address which is assigned to the SERCOS sub-device.

12.2. S-0-1046 List of SERCOS addresses in device

The device stores the SERCOS addresses of the slaves that participate in the communication.

IO FUNCTION GROUPS

13.1. S-0-1500 IO Bus Head

13.1.1. S-0-1500-x-01 IO Control

This value is set to define the operation state of the outputs.

13.1.2. S-0-1500-x-02 IO Status

This value indicates the actual states of the I/O.

13.1.3. S-0-1500-x-05 Container OutputData

This parameter contains the state of all outputs.

13.1.4. S-0-1500-x-09 Container InputData

This parameter contains the state of all inputs.

13.2. S-0-1502 Digital Output

NB: *x* = number of the module

S-0-1502.*x*.3 Channel quantity PDOUT: number of digital outputs

S-0-1502.*x*.4 Channel width PDOUT: always 1 bit

S-0-1502.*x*.5 PDOUT: state of the digital outputs of the module *x*

S-0-1502.*x*.6 Offset PDOUT in Container OutputData: offset in bytes in the container OutputData

13.3. S-0-1503 Digital Intput

S-0-1503.*x*.7 Channel quantity PDIN: number of digital inputs

S-0-1503.*x*.8 Channel width PDIN: always 1 bit

S-0-1503.*x*.9 PDIN: state of the digital inputs of the module *x*

S-0-1503.*x*.10 Offset PDIN in Container InputData: offset in bytes in the container InputData

13.4. S-0-1504 Analog Output

S-0-1504.*x*.3 Channel quantity PDOUT: number of analog outputs

S-0-1504.*x*.4 Channel width PDOUT: always 32 bits float format.

S-0-1505.*x*.5 PDOUT: state of the analog outputs of the module *x*

S-0-1505.*x*.6 Offset PDOUT in Container OutputData: offset in bytes in the container OutputData

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13.5. S-0-1505 Analog Input

S-0-1505.*x*.7 Channel quantity PDIN: number of analog inputs
S-0-1505.*x*.8 Channel width PDIN: always 32 bits float format.
S-0-1505.*x*.9 PDIN: state of the analog inputs of the module *x*
S-0-1505.*x*.10 Offset PDIN in Container InputData: offset in bytes in the container InputData

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14. S-0-0129 MANUFACTURER CLASS 1 DIAGNOSTIC

Bits	Value
15-3	Reserved
2	Safety Errors 0: No "SAFETY" error 1: "SAFETY" error occurs. Controller needs to be rebooted.
1-0	ESTOP Fault acknowledgment 00: EStop fault has been repaired and acknowledge 01: EStop fault but the input is invisible[2] 10: EStop fault but the input is visible[3] 11: EStop fault has been repaired, uniVAL is waiting for acknowledgement

14.1. ESTOP Fault acknowledgment

When an Estop fault is detected,

- S-0-0135 bit13 is set and bit14 and bit15 report NOT_READY_TO_OPERATE(0).
- S-0-0011 bit15 is set.
- S-0-0095 returns the name of the signal in fault.
- bit1 and bit0 of IDN129 give the status of the Estop fault according to the following table.

When S-0-0129 bit0 and bit1 are both set, S-0-0099 can be called this:

- reset S-0-0135 bit13 is and bit14 and bit15 repots POWER_READY(2)
- reset S-0-0011 bit15
- reset S-0-0129 bit0 and bit1 (if not already cleared from the MCP control panel)

When one of S-0-129 bit 0 and 1 is set and S-0-0099 is called:

- procedure command returns executed (0x03)
- no bit is cleared

14.2. Safety errors

When such events occur, a “SAFETY” event with an associated error code is logged. These situations should normally not happen and are recovered by a controller reboot.

[2] Invisible means that the safety chain is open above the faulty signal so the system can cannot see it.
For example if teach pendant e-stop is active, the door Estop invisible from the system.
[3] Visible means that when the faulty input signal will be cycle (off/on/off) the system is able to see it.

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15. IP SETTINGS

15.1. S-0-1020 IP address

15.1.1. S-0-1020: IP address

Actual length (2 bytes)	Maximum length (2 bytes)	IPv4 address: 141.70.124.199			
0x00004	0x00004	141	70	124	199

15.1.2. S-0-1020.0.1: actual activated IP address

(Idem as S-0-1020)

15.2. S-0-1021 Subnet Mask

15.2.1. S-0-1021: subnet mask

(Idem as S-0-1020)

15.2.2. S-0-1021.0.1: actual activated subnet mask

(Idem as S-0-1020)

15.3. S-0-1022 Gateway address

15.3.1. S-0-1022: Gateway address

(Idem as S-0-1020)

15.3.2. S-0-1022.0.1: actual activated gateway address

(Idem as S-0-1020)

15.4. S-0-1048 Activate IP settings

This procedure command activates the IP address, subnet mask and gateway address written respectively in S-0-1020, S-0-1021 and S-0-1022.

16. POSITION AND COARSE POSITION WINDOW

16.1. S-0-0057 Position window

When the difference between the accumulated position command value and the position feedback value is within the range of the position window, then the drive sets the status “in position” (S-0-0336). If needed, the status 'in position' may be assigned to a real-time bit.

16.2. S-0-0336 Status "In position"

This parameter is used to define an IDN for the status 'in position' to be assigned to a real-time status bit. The status 'in position' is set when the position feedback value falls within the position window (see S-0-0057) relative to the position command value (see S-0-0047). Bit 0 is defined for operation data only.

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16.3. S-0-0261 Coarse position window

When the difference between the accumulated position command value and the position feedback value is within the range of the “coarse position window”, then the drive sets the status “In coarse position” (S-0-0341). If needed, the status 'in coarse position' is assigned to a real-time bit.

16.4. S-0-0341 Status “In Coarse position”

This parameter is used to define an IDN for the ‘in coarse position’ status. This allows the status to be assigned, for instance, to a real-time status bit. The status 'in coarse position' is set when the position feedback value falls within the coarse position window (see S-0-0261) relative to the position command value (see S-0-0047). Bit 0 is defined for operation data only.

17. REAL-TIME BITS

17.1. S-0-0398 IDN list of configurable real-time bits as producer

This IDN list contains ident numbers, whose bits are configurable as real-time bits in a producer connection.

17.2. S-0-0399 IDN list of configurable real-time bits as consumer

This IDN list contains ident numbers, whose bits are configurable as real-time bits in a consumer connection.

NB: uniVAL does not consume any real time bits so this list is empty.

17.3. S-0-1050.0.20 IDN Allocation of real-time bit as consumer

In order to assign signals to the real-time bits (see S-0-0398 IDN list of configurable real-time bits as producer and S-0-0399 IDN list of configurable real-time bits as consumer), the IDN of the signal is written to this parameter. After the allocation of the IDN and the bit number (see S-0-1050.x.21 Bit allocation of real-time bit), the assigned signal is copied in the corresponding real-time bit. This parameter contains maximum 2 list elements.

Real-time bit 1 and 2 are present in the S-0-1050.x.08 Connection Control (C-CON).

List element 0 corresponds to real-time bit 1: IDN of assigned signal

List element 1 corresponds to real-time bit 2: IDN of assigned signal

See also S-0-1050.x.21 Bit allocation of real-time bit.

NB: uniVAL does not consume any real time bits so this list is empty.

17.4. S-0-1050.0.21 Bit allocation of real-time bit as consumer

This parameter contains the bit number of the operation data assigned in the S-0-1050.x.20 IDN Allocation of real-time bit. The signal assigned by the IDN in S-0-1050.x.20 and the bit number in this parameter is copied into the corresponding real-time bit. This parameter contains a maximum of 2 list elements.

Real-time bit 1 and 2 are present in the S-0-1050.x.08 Connection Control (C-CON).

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List element 0 corresponds to real-time bit 1: bit number of assigned signal

List element 1 corresponds to real-time bit 2: bit number of assigned signal

See also S-0-1050.x.20 IDN Allocation of real-time bit.

NB: uniVAL does not consume any real time bits so this list is empty.

17.5. S-0-1050.1.20 IDN Allocation of real-time bit as producer

uniVAL can produce real time bit corresponding to IDN S-0-0310 S-0-0336 and S-0-0341. See description of S-0-1050.0.20.

17.6. S-0-1050.1.21 Bit allocation of real-time bit as producer

uniVAL can produce real time bit corresponding to IDN S-0-0310 S-0-0336 and S-0-0341. See description of S-0-1050.0.21.

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18. MISCELLANEOUS

18.1. S-0-1300.0.x

18.1.1. S-0-1300.0.02 Vendor Name

This value is set to the string: Stäubli.

18.1.2. S-0-1300.0.03 Vendor Code

This value is set to 0.

18.1.3. S-0-1300.0.04 Device Name

This value is set to the string: uniVAL.

18.1.4. S-0-1300.0.05 Vendor Device ID

This value is set to the string: uniVAL.

18.1.5. S-0-1300.0.09 Software revision

This value is the software revision of the uniVAL software.

18.1.6. S-0-1300.0.12 Serial number

This value is the Stäubli serial number of the controller.

18.1.7. S-0-1300.0.13 Manufacturing date

This value is building date of the uniVAL software.

18.2. S-0-1300.1.x

18.2.1. S-0-1300.1.02 Vendor Name

This value is set to the string: Stäubli.

18.2.2. S-0-1300.1.03 Vendor Code

This value is set to 0.

18.2.3. S-0-1300.1.04 Device Name

This value is set to the string: system.

18.2.4. S-0-1300.1.05 Vendor Device ID

This value is set to the string: system.

18.2.5. S-0-1300.1.09 Software revision

This value is the software revision of the controller sofftware.

18.2.6. S-0-1300.1.12 Serial number

This value is the Stäubli serial number of the controller.

18.2.7. S-0-1300.1.13 Manufacturing date

This value is building date of the controller software.

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18.3. S-0-1300.2.x

18.3.1. S-0-1300.2.02 Vendor Name

This value is set to the string: Stäubli.

18.3.2. S-0-1300.2.03 Vendor Code

This value is set to 0.

18.3.3. S-0-1300.2.04 Device Name

This value is the arm name. For example: tx90-S1-R1

18.3.4. S-0-1300.2.05 Vendor Device ID

This value is the arm name. For example: tx90-S1-R1

18.3.5. S-0-1300.2.12 Serial number

This value is the Stäubli serial number of the arm connected to the controller.

18.4. S-0-1300.3.x

18.4.1. S-0-1300.3.02 Vendor Name

This value is set to the string: Stäubli.

18.4.2. S-0-1300.3.03 Vendor Code

This value is set to 0.

18.4.3. S-0-1300.3.04 Device Name

This value is the arm name followed by axis number. For example: tx90-S1-R1; axis1

18.4.4. S-0-1300.3.05 Vendor Device ID

This value is the arm name followed by axis number. For example: tx90-S1-R1; axis1

18.4.5. S-0-1300.3.12 Serial number

This value is the Stäubli serial number of the arm connected to the controller.

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19. APPENDIX

Depending on the robot, uniVAL sub-devices could be either configured for a rotational axis or for a linear axis. Moreover, uniVAL could optionally include an IO sub-device.

Therefore, hereafter are the lists of IDN supported by uniVAL for each kind of sub-devices.

19.1. IDN list for rotational axis.

P-0-0001	S-0-0043	S-0-0189	S-0-1022.0.1	S-0-1050.1.6
P-0-0002	S-0-0044	S-0-0261	S-0-1023	S-0-1050.1.20
P-0-0003	S-0-0045	S-0-0292	S-0-1024	S-0-1050.1.21
P-0-0004	S-0-0046	S-0-0310	S-0-1026	S-0-1050.2.1
P-0-0005	S-0-0047	S-0-0336	S-0-1027.0.1	S-0-1050.2.10
P-0-0010	S-0-0049	S-0-0341	S-0-1027.0.2	S-0-1050.2.11
P-0-0011	S-0-0050	S-0-0390	S-0-1028	S-0-1050.2.12
P-0-0012	S-0-0051	S-0-0398	S-0-1035	S-0-1050.2.2
P-0-0013	S-0-0052	S-0-0399	S-0-1039	S-0-1050.2.3
P-0-0014	S-0-0055	S-0-0403	S-0-1040	S-0-1050.2.4
P-0-0015	S-0-0057	S-0-0447	S-0-1041	S-0-1050.2.5
P-0-0016	S-0-0076	S-0-0448	S-0-1044	S-0-1050.2.6
P-0-1520	S-0-0079	S-0-1000	S-0-1045	S-0-1050.3.1
P-0-1521	S-0-0084	S-0-1002	S-0-1046	S-0-1050.3.10
P-0-1522	S-0-0085	S-0-1003	S-0-1048	S-0-1050.3.11
P-0-1523	S-0-0086	S-0-1005	S-0-1050.0.1	S-0-1050.3.12
P-0-1534	S-0-0093	S-0-1006	S-0-1050.0.10	S-0-1050.3.2
P-0-1535	S-0-0094	S-0-1007	S-0-1050.0.11	S-0-1050.3.3
P-0-1536	S-0-0095	S-0-1008	S-0-1050.0.12	S-0-1050.3.4
P-0-1537	S-0-0099	S-0-1009	S-0-1050.0.2	S-0-1050.3.5
P-7-0001	S-0-0103	S-0-1010	S-0-1050.0.3	S-0-1050.3.6
P-7-0002	S-0-0121	S-0-1011	S-0-1050.0.4	S-0-1051
S-0-0011	S-0-0122	S-0-1012	S-0-1050.0.5	S-0-1300.0.12
S-0-0012	S-0-0123	S-0-1013	S-0-1050.0.6	S-0-1300.0.13
S-0-0014	S-0-0124	S-0-1014	S-0-1050.0.20	S-0-1300.0.2
S-0-0015	S-0-0127	S-0-1015	S-0-1050.0.21	S-0-1300.0.3
S-0-0017	S-0-0128	S-0-1016	S-0-1050.1.1	S-0-1300.0.4
S-0-0021	S-0-0129	S-0-1017	S-0-1050.1.10	S-0-1300.0.5
S-0-0022	S-0-0134	S-0-1019	S-0-1050.1.11	S-0-1300.0.9
S-0-0025	S-0-0135	S-0-1020	S-0-1050.1.12	S-0-1300.1.12
S-0-0032	S-0-0159	S-0-1020.0.1	S-0-1050.1.2	S-0-1300.1.13
S-0-0033	S-0-0175	S-0-1021	S-0-1050.1.3	S-0-1300.1.2
S-0-0036	S-0-0187	S-0-1021.0.1	S-0-1050.1.4	S-0-1300.1.3
S-0-0040	S-0-0188	S-0-1022	S-0-1050.1.5	S-0-1300.1.4

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S-0-1300.1.5	S-0-1300.2.3	S-0-1300.3.2	S-0-1301	S-0-1303.0.11
S-0-1300.1.9	S-0-1300.2.4	S-0-1300.3.3	S-0-1302.0.1	S-0-1303.0.2
S-0-1300.2.12	S-0-1300.2.5	S-0-1300.3.4	S-0-1303.0.1	S-0-1303.0.3
S-0-1300.2.2	S-0-1300.3.12	S-0-1300.3.5	S-0-1303.0.10	S-0-1305.0.1

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19.2. IDN list for linear axis.

P-0-0001	S-0-0047	S-0-0398	S-0-1044	S-0-1050.3.12
P-0-0002	S-0-0049	S-0-0399	S-0-1045	S-0-1050.3.2
P-0-0003	S-0-0050	S-0-0403	S-0-1046	S-0-1050.3.3
P-0-0004	S-0-0051	S-0-0447	S-0-1048	S-0-1050.3.4
P-0-0005	S-0-0052	S-0-0448	S-0-1050.0.1	S-0-1050.3.5
P-0-0010	S-0-0055	S-0-1000	S-0-1050.0.10	S-0-1050.3.6
P-0-0011	S-0-0057	S-0-1002	S-0-1050.0.11	S-0-1051
P-0-0012	S-0-0076	S-0-1003	S-0-1050.0.12	S-0-1300.0.12
P-0-0013	S-0-0077	S-0-1005	S-0-1050.0.2	S-0-1300.0.13
P-0-0014	S-0-0078	S-0-1006	S-0-1050.0.3	S-0-1300.0.2
P-0-0015	S-0-0084	S-0-1007	S-0-1050.0.4	S-0-1300.0.3
P-0-0016	S-0-0085	S-0-1008	S-0-1050.0.5	S-0-1300.0.4
P-0-1520	S-0-0086	S-0-1009	S-0-1050.0.6	S-0-1300.0.5
P-0-1521	S-0-0093	S-0-1010	S-0-1050.0.20	S-0-1300.0.9
P-0-1522	S-0-0094	S-0-1011	S-0-1050.0.21	S-0-1300.1.12
P-0-1523	S-0-0095	S-0-1012	S-0-1050.1.1	S-0-1300.1.13
P-0-1534	S-0-0099	S-0-1013	S-0-1050.1.10	S-0-1300.1.2
P-0-1535	S-0-0103	S-0-1014	S-0-1050.1.11	S-0-1300.1.3
P-0-1536	S-0-0121	S-0-1015	S-0-1050.1.12	S-0-1300.1.4
P-0-1537	S-0-0122	S-0-1016	S-0-1050.1.2	S-0-1300.1.5
P-7-0001	S-0-0123	S-0-1017	S-0-1050.1.3	S-0-1300.1.9
P-7-0002	S-0-0124	S-0-1019	S-0-1050.1.4	S-0-1300.2.12
S-0-0011	S-0-0127	S-0-1020	S-0-1050.1.5	S-0-1300.2.2
S-0-0012	S-0-0128	S-0-1020.0.1	S-0-1050.1.6	S-0-1300.2.3
S-0-0014	S-0-0129	S-0-1021	S-0-1050.1.20	S-0-1300.2.4
S-0-0015	S-0-0134	S-0-1021.0.1	S-0-1050.1.21	S-0-1300.2.5
S-0-0017	S-0-0135	S-0-1022	S-0-1050.2.1	S-0-1300.3.12
S-0-0021	S-0-0159	S-0-1022.0.1	S-0-1050.2.10	S-0-1300.3.2
S-0-0022	S-0-0175	S-0-1023	S-0-1050.2.11	S-0-1300.3.3
S-0-0025	S-0-0187	S-0-1024	S-0-1050.2.12	S-0-1300.3.4
S-0-0032	S-0-0188	S-0-1026	S-0-1050.2.2	S-0-1300.3.5
S-0-0033	S-0-0189	S-0-1027.0.1	S-0-1050.2.3	S-0-1301
S-0-0036	S-0-0261	S-0-1027.0.2	S-0-1050.2.4	S-0-1302.0.1
S-0-0040	S-0-0292	S-0-1028	S-0-1050.2.5	S-0-1303.0.1
S-0-0043	S-0-0310	S-0-1035	S-0-1050.2.6	S-0-1303.0.10
S-0-0044	S-0-0336	S-0-1039	S-0-1050.3.1	S-0-1303.0.11
S-0-0045	S-0-0341	S-0-1040	S-0-1050.3.10	S-0-1303.0.2
S-0-0046	S-0-0390	S-0-1041	S-0-1050.3.11	S-0-1303.0.3

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S-0-1305.0.1

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19.3. IDN list for IO.

P-0-0002	S-0-1005	S-0-1050.0.2	S-0-1300.0.5	S-0-1502.3.4
P-0-0003	S-0-1006	S-0-1050.0.3	S-0-1300.0.9	S-0-1502.3.5
P-0-0004	S-0-1007	S-0-1050.0.4	S-0-1300.1.12	S-0-1502.7.2
P-0-0005	S-0-1008	S-0-1050.0.5	S-0-1300.1.13	S-0-1502.7.3
P-0-0010	S-0-1009	S-0-1050.0.6	S-0-1300.1.2	S-0-1502.7.4
P-0-0011	S-0-1010	S-0-1050.1.1	S-0-1300.1.3	S-0-1502.7.5
P-0-0012	S-0-1011	S-0-1050.1.10	S-0-1300.1.4	S-0-1502.8.2
P-0-0013	S-0-1012	S-0-1050.1.11	S-0-1300.1.5	S-0-1502.8.3
P-0-0014	S-0-1013	S-0-1050.1.12	S-0-1300.1.9	S-0-1502.8.4
P-0-0015	S-0-1014	S-0-1050.1.2	S-0-1300.2.12	S-0-1502.8.5
P-0-0016	S-0-1015	S-0-1050.1.3	S-0-1300.2.2	S-0-1502.9.2
P-0-1520	S-0-1016	S-0-1050.1.4	S-0-1300.2.3	S-0-1502.9.3
P-0-1521	S-0-1017	S-0-1050.1.5	S-0-1300.2.4	S-0-1502.9.4
P-0-1522	S-0-1019	S-0-1050.1.6	S-0-1300.2.5	S-0-1502.9.5
P-0-1523	S-0-1020	S-0-1050.2.1	S-0-1301	S-0-1503.1.2
P-0-1534	S-0-1020.0.1	S-0-1050.2.10	S-0-1302.0.1	S-0-1503.1.7
P-0-1535	S-0-1021	S-0-1050.2.11	S-0-1302.0.2	S-0-1503.1.8
P-0-1536	S-0-1021.0.1	S-0-1050.2.12	S-0-1303.0.1	S-0-1503.1.9
P-0-1537	S-0-1022	S-0-1050.2.2	S-0-1303.0.10	S-0-1503.10.2
P-7-0001	S-0-1022.0.1	S-0-1050.2.3	S-0-1303.0.11	S-0-1503.10.7
P-7-0002	S-0-1023	S-0-1050.2.4	S-0-1303.0.2	S-0-1503.10.8
S-0-0011	S-0-1024	S-0-1050.2.5	S-0-1303.0.3	S-0-1503.10.9
S-0-0014	S-0-1026	S-0-1050.2.6	S-0-1305.0.1	S-0-1503.11.2
S-0-0015	S-0-1027.0.1	S-0-1050.3.1	S-0-1500.0.1	S-0-1503.11.7
S-0-0017	S-0-1027.0.2	S-0-1050.3.10	S-0-1500.0.2	S-0-1503.11.8
S-0-0021	S-0-1028	S-0-1050.3.11	S-0-1500.0.3	S-0-1503.11.9
S-0-0022	S-0-1035	S-0-1050.3.12	S-0-1500.0.5	S-0-1503.3.2
S-0-0025	S-0-1039	S-0-1050.3.2	S-0-1500.0.9	S-0-1503.3.7
S-0-0095	S-0-1040	S-0-1050.3.3	S-0-1502.10.2	S-0-1503.3.8
S-0-0099	S-0-1041	S-0-1050.3.4	S-0-1502.10.3	S-0-1503.3.9
S-0-0127	S-0-1044	S-0-1050.3.5	S-0-1502.10.4	S-0-1503.5.2
S-0-0128	S-0-1045	S-0-1050.3.6	S-0-1502.10.5	S-0-1503.5.7
S-0-0187	S-0-1046	S-0-1051	S-0-1502.11.2	S-0-1503.5.8
S-0-0188	S-0-1048	S-0-1300.0.12	S-0-1502.11.3	S-0-1503.5.9
S-0-0390	S-0-1050.0.1	S-0-1300.0.13	S-0-1502.11.4	S-0-1503.6.2
S-0-1000	S-0-1050.0.10	S-0-1300.0.2	S-0-1502.11.5	S-0-1503.6.7
S-0-1002	S-0-1050.0.11	S-0-1300.0.3	S-0-1502.3.2	S-0-1503.6.8
S-0-1003	S-0-1050.0.12	S-0-1300.0.4	S-0-1502.3.3	S-0-1503.6.9

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S-0-1503.7.2	S-0-1503.9.2	S-0-1504.8.2	S-0-1505.2.2	S-0-1505.8.2
S-0-1503.7.7	S-0-1503.9.7	S-0-1504.8.3	S-0-1505.2.7	S-0-1505.8.7
S-0-1503.7.8	S-0-1503.9.8	S-0-1504.8.4	S-0-1505.2.8	S-0-1505.8.8
S-0-1503.7.9	S-0-1503.9.9	S-0-1504.8.5	S-0-1505.2.9	S-0-1505.8.9
S-0-1503.8.2	S-0-1504.12.2	S-0-1505.12.2	S-0-1505.4.2	
S-0-1503.8.7	S-0-1504.12.3	S-0-1505.12.7	S-0-1505.4.7	
S-0-1503.8.8	S-0-1504.12.4	S-0-1505.12.8	S-0-1505.4.8	
S-0-1503.8.9	S-0-1504.12.5	S-0-1505.12.9	S-0-1505.4.9	

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