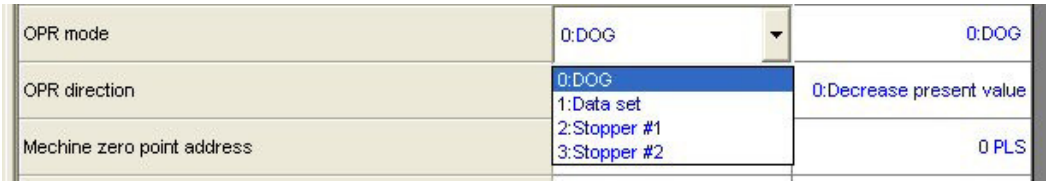
Issued by: Mitsubishi Electric Europe B.V. - UK Branch
Document issue: V1.00
Produced by : - CTC
Travellers Lane, Hatfield, Herts, AL10 8XB, UK
Author: Matt Wills

Databank - Technical Bulletin

This DataSheet covers the 4 different types or OPR Method for the 20SSC-H module and how to configure and execute each of them.

The 4 different types of OPR method are:



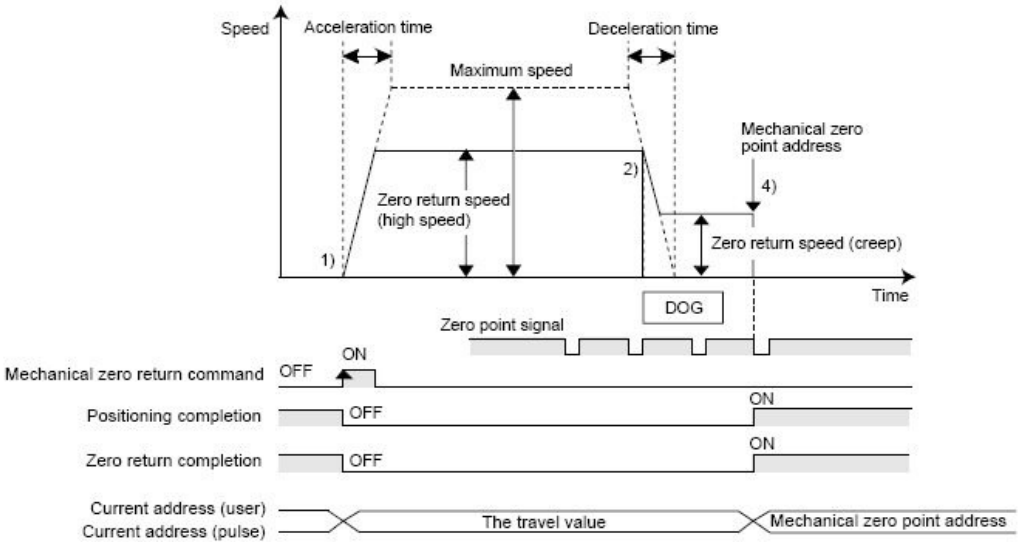
0: DOG Search - Search for a DOG switch and stop on a Z phase after DOG OFF-ON-OFF.
1: Data Set type - Set Current motor position as Home/Origin
2: Stopper #1 – A physical Stopper is used to zero the OPR/Origin. Stopper #1 uses a DOG switch before the stopper to allow high speed travel up to the DOG.
3: Stopper #2 – As Stopper #1 but no DOG is used.

Method 0: DOG Search

With the DOG type mechanical zero return, the 20SSC-H sets the zero-point as the position where the module stops with a near-point DOG signal and servo motor zero-point signal (Z Phase)

1. Operation

Zero return starts as follows, at the rising edge (OFF to ON) of the mechanical zero return command:



Issued by: Mitsubishi Electric Europe B.V. - UK Branch
Document issue: V1.00
Produced by : - CTC
Travellers Lane, Hatfield, Herts, AL10 8XB, UK
Author: Matt Wills

1) At the rising edge (OFF to ON) of the mechanical zero return command, the work piece moves in the zero return direction at the zero return speed (high speed).

2) At the DOG input, the 20SSC-H decelerates the work piece to the zero return speed (creep).

3) The 20SSC-H counts zero-point signals (Z Phase) after passing the zero-point signal count start timing.

4) After counting the specified number (zero-point signal numbers), the 20SSC-H stops the work piece.

5) After the zero-point is reached, the work piece does not travel with a the mechanical zero return command.

6) The 20SSC-H turns the positioning completion flag ON and sets the zero return execution flag.

Some Notes:
• The zero return command is not accepted if the zero-point pass signal servo status is OFF. Before executing zero return, be sure to rotate the servomotor at least once to turn the zero-point pass signal ON. The zero-point pass signal turns ON when the motor passes the motor reference position signal (Z-phase).
To execute zero return immediately after power-on, specify "1: Motor Z-phase pass unnecessary after power-on" (default setting) at servo parameter function selection C-4. With this setting, the zero-point pass signal turns ON even if the motor does not pass the zero-point (Z-phase).

• With the simultaneous start flag ON, the X-axis mechanical zero return command simultaneously starts the X and Y-axes mechanical zero return operation.
(The 20SSC-H ignores the Y-axis mechanical zero return command.)

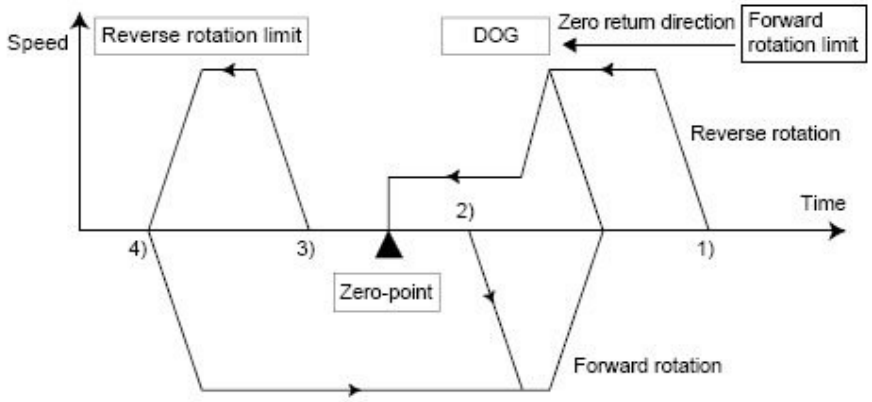
2. Setting items
With DOG type mechanical zero return, specify the following settings:

Setting item	Description
Zero return mode	Specify the DOG type zero return mode.
Zero return speed (high speed)	Enter the zero return speed (high speed)
Zero return speed (creep)	Specify the post-DOG-input zero return speed (creep).
Zero return direction	Specify the zero return direction (the current value increase/decrease direction).
DOG input selection	Select the DOG input (servo amplifier/20SSC-H) to be used.
DOG input logic	Specify the logic (NO/NC contact) of the DOG input to be used.
Zero-point signal count start timing	Specify the timing (front/rear edge of DOG) to start counting the zero-point signal.
Zero-point signal count	Specify the zero-point signal count.
Mechanical zero-point address	Specify the current address (user unit) written after the mechanical zero return completion.

Issued by: Mitsubishi Electric Europe B.V. - UK Branch
Document issue: V1.00
Produced by : - CTC
Travellers Lane, Hatfield, Herts, AL10 8XB, UK
Author: Matt Wills

3. Dog search function

The zero return with DOG Search function is available using the forward/reverse rotation Limit1 from the PLC I/O. During this operation the DOG Search OPR will vary according to the machine position upon OPR request:



1) If the starting position is in the near point signal OFF area (before passing DOG)
   a) Operation is conducted in the zero return direction at the zero return speed (high speed).
   b) After the DOG detection, the deceleration to the zero return speed (creep) begins.
   c) After detecting the zero-point signal count start timing, the zero-point signal is counted.
   d) After counting the specified number of zero-point signals, the travel is stopped.

2) If the starting position is in the near point signal ON area
   a) Operation is conducted at the zero return speed in the direction opposite to the zero return direction.
   b) Upon the DOG detection (escaping from the DOG), the deceleration to stop begins.
   c) Operation is conducted in the zero return direction at the zero return speed (high speed).
   d) After the DOG is detected, deceleration to the zero return speed (creep) begins.
   e) After counting the zero-point signal, the 20SSC-H stops.

3) If the starting position is in the near point signal OFF area (after passing DOG)
   a) Operation is conducted in the zero return direction at the zero return speed (high speed).
   b) Upon the forward/reverse rotation limit, the travel decelerates to stop.
   c) Operation is conducted in the direction opposite to the zero return direction at the zero return speed (high speed).
   d) Upon the DOG detection (escaping from the DOG), the travel decelerates to stop. The operation begins again in the zero return direction at the zero return speed (high speed).
   e) After DOG detection, the travel decelerates to the zero return speed (creep speed) and, after counting the zero-point signal, the 20SSC-H stops.

4) When the limit switch (forward or reverse rotation limit) in the zero return direction turns ON
   a) The operation is conducted in the direction opposite to the zero return direction at the zero return speed (high speed).
   b) Upon the DOG detection (escaping from the DOG), the travel decelerates to stop.
   c) The operation is conducted again in the zero return direction at the zero return speed (high speed).
   d) Upon the DOG detection, the travel decelerates to the zero return speed (creep speed) and after counting the zero-point signal, the 20SSC-H stops.

Issued by: Mitsubishi Electric Europe B.V. - UK Branch
Document issue: V1.00
Produced by : - CTC
Travellers Lane, Hatfield, Herts, AL10 8XB, UK
Author: Matt Wills

Method 1: Data-Set

Use the data-set type mechanical zero return procedure to set the position moved by JOG or manual pulse generator operation, as a zero-point. Therefore the work piece does not travel at the mechanical zero return command.
This zero return procedure is frequently used for equipment without a DOG, or for transfer lines without a mechanical zero-point.

1. Operation

1) With JOG or manual pulse generator operation, the work piece moves to the desired zero-point.

2) Reboot the mechanical zero return command.

3) Write the mechanical zero-point address, specified in positioning parameters to the current address.

4) Set the zero return execution flag.
In the data-set type mechanical zero return, the positioning completion flag does not turn ON.

Some Notes:
• The zero return command is not accepted if the zero-point pass signal servo status is OFF. Before executing zero return, be sure to rotate the servomotor at least once to turn the zero-point pass signal ON. The zero-point pass signal turns ON when the motor passes the motor reference position signal (Z-phase).
To execute zero return immediately after power-on, specify "1: Motor Z-phase pass unnecessary after power-on" (default setting) at servo parameter function selection C-4. With this setting, the zero-point pass signal turns ON even if the motor does not pass the zero-point (Z-phase).

• With the simultaneous start flag ON, the X-axis mechanical zero return command simultaneously starts the X and Y-axes mechanical zero return operation.
(The 20SSC-H ignores the Y-axis mechanical zero return command.)

2. Setting items
In the data-set type zero return, specify the following settings.

Setting item	Description
Zero return mode	Specify the data-set type zero return mode.
Mechanical zero return address	Specify the current address (user unit) after the mechanical zero return completion.

Method 2/3: Stopper 1/2:

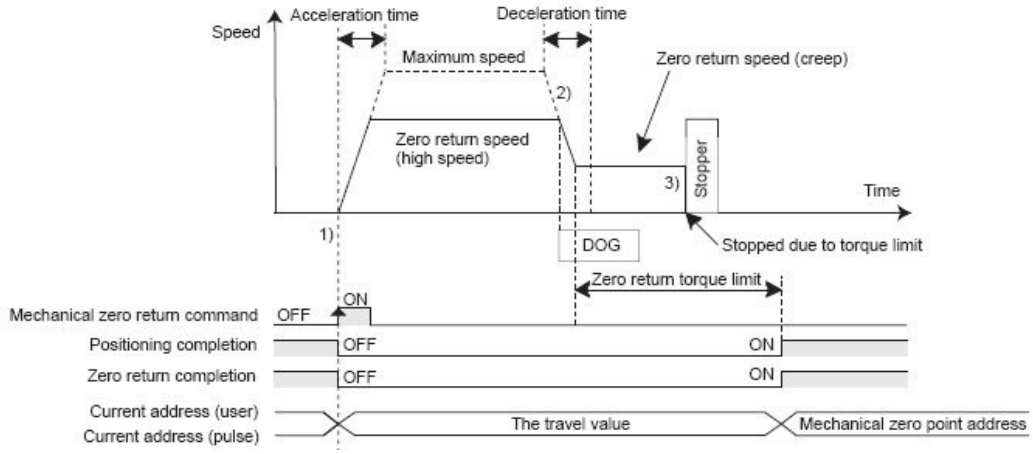
The stopper position is defined as the zero-point. The stopper type mechanical zero return includes thefollowing two types (modes).
• **Stopper type (1)**
This mechanical zero return method uses the DOG signal and stopper.
The high speed travel is possible up to the DOG signal, so this zero return type reduces the time for mechanical return.
• **Stopper type (2)**
This mechanical zero return method uses only the stopper.

Issued by: Mitsubishi Electric Europe B.V. - UK Branch
Document issue: V1.00
Produced by : - CTC
Travellers Lane, Hatfield, Herts, AL10 8XB, UK
Author: Matt Wills

Some Notes:
• The zero return command is not accepted if the zero-point pass signal servo status is OFF. Before executing zero return, be sure to rotate the servomotor at least once to turn the zero-point pass signal ON. The zero-point pass signal turns ON when the motor passes the motor reference position signal (Z-phase).
To execute zero return immediately after power-on, specify "1: Motor Z-phase pass unnecessary after power-on" (default setting) at servo parameter function selection C-4. With this setting, the zero-point pass signal turns ON even if the motor does not pass the zero-point (Z-phase).

• With the simultaneous start flag ON, the X-axis mechanical zero return command simultaneously starts the X and Y-axes mechanical zero return operation.
(The 20SSC-H ignores the Y-axis mechanical zero return command.)

1. Stopper type (1) operation



1) At the rising edge (OFF ON) of the mechanical zero return command, the work piece moves in the zero return direction at the zero return speed (high speed).

2) At the DOG input, the 20SSC-H decelerates the work piece to the zero return speed (creep).

3) The work piece hits the stopper, and the work piece stops when the servomotor torque reaches the zero return torque limit value.

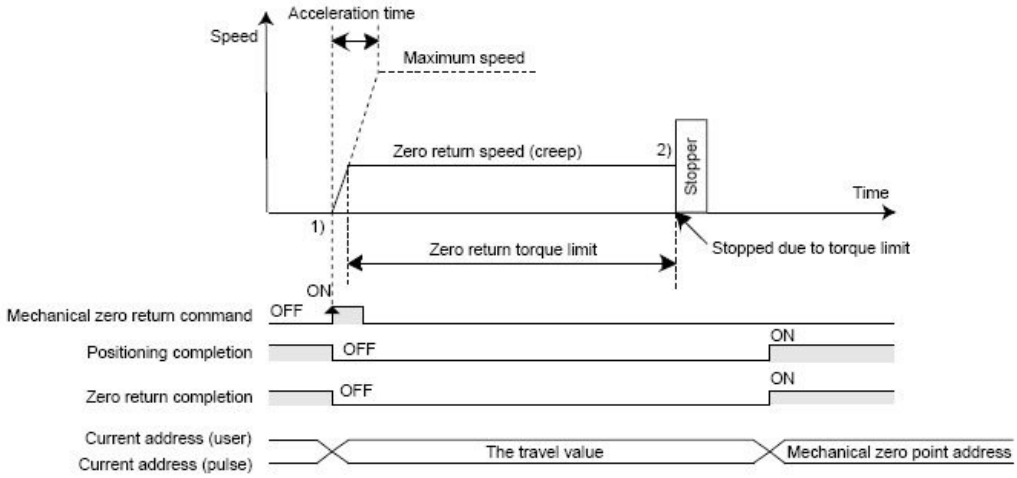
4) After the stop point, the 20SSC-H writes the mechanical zero point address, specified in positioning parameters, to the current address.

5) The 20SSC-H turns the positioning completion flag ON and sets (turns ON) the zero return execution flag.

Dog position
Install the DOG at a position far enough from the stopper for the work piece to decelerate to the zero-point return speed (creep).

Issued by: Mitsubishi Electric Europe B.V. - UK Branch
Document issue: V1.00
Produced by : - CTC
Travellers Lane, Hatfield, Herts, AL10 8XB, UK
Author: Matt Wills

1. Stopper type (2) operation



1) Upon the rising edge (OFF ON) of the mechanical zero return command, the work piece moves in the zero return direction at the zero return speed (creep).

2) After the work piece hits the stopper, the work piece stops when the servomotor torque reaches the zero return torque limit value.

3) After the stop, the 20SSC-H writes the mechanical zero point address, specified in positioning parameters, to the current address.

4) The 20SSC-H turns the positioning completion flag ON and sets (turns ON) the zero return execution flag.

3. Setting item

In the stopper type mechanical zero return, specify the following settings.

Setting item	Description
Zero return mode	Specify the stopper type 1 (2) zero return mode.
Zero return speed (high speed)	Specify the zero return speed (high speed).
Zero return speed (creep)	Specify the post-DOG-input zero return speed (creep).
Zero return direction	Specify the zero return direction (current value increase/decrease direction).
Selection of DOG input	Select the DOG input (servo amplifier/20SSC-H) to be used.
DOG input logic	Specify the logic (NO/NC contact) of the DOG input to be used.
Mechanical zero-point address	Specify the current address (user unit) written after the mechanical zero return completion.
Zero return torque limit	Specify the torque limit value for zero return speed (creep).