

# Scheduling with Timed functions in the ACH580

## Group 34 Timed function examples

The following technical note will assist with the programming of “*Timed functions*” using parameter group 34 in the ACH580. Concepts apply to a wide range of applications for control and management of equipment such as air handlers or cooling towers. This document focuses on the full features available in group 34 including the ability to implement exceptions as well as a seasonal schedule. Read the entire technical note before commencing with implementation of these functions. This technical note is intended for an audience that has experience working with VFDs and motors in HVACR applications. This document is intended as a supplement to the existing ACH580 firmware manuals and to expand upon [Technical Note 156](#) Timed Functions in the ACH580. All traditional safety requirements along with physical and electrical installation are outside the scope of this document.

Topics to be covered:

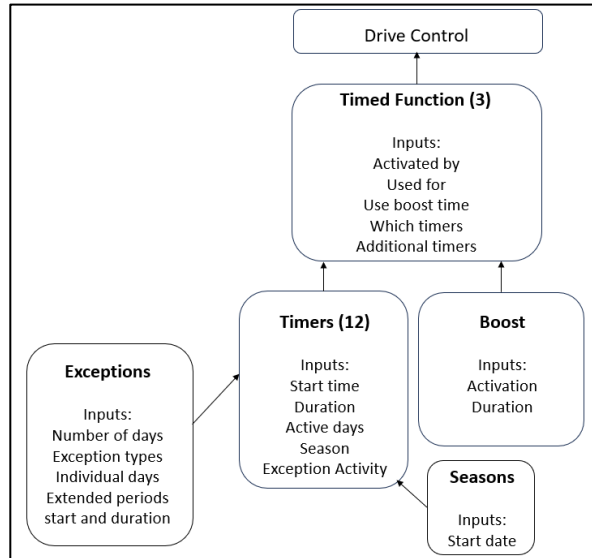
1. Overview of *Timed functions* in group 34
2. What *Timed functions* can be used for
3. *Timed function* considerations
  - a. Developing a schedule
  - b. Parameter group 34 configuration
4. Configuration examples
  - a. AHU management of electric heat
  - b. Changing between PID set points in an HVACR application
  - c. Constant frequency operation based on Timed functions
5. Other considerations
  - a. Time sync through automation system, or manually at the drive
  - b. Bypass considerations
  - c. Summary

### Overview of *Timed functions* in group 34

The drive can be programmed to perform functions based on three separate *Timed functions* that are comprised of up to 12 individual timers each. The daily timers that comprise a *Timed function* can be programmed to be active at a given time based on daily, weekly and or seasonal scheduling. Through programming in *Timed functions*, there is the ability to execute seasonal scheduling based on four seasons. Exception dates and periods can also be included in the schedule when configuring using group 34 parameters. There are sixteen yearly exception days available, which include 3 that allow adjustable periods. A timer can be set to be active or inactive during the days of an exception.

When any timer connected to a *Timed function* is active, the *Timed function* is also active. The Timed function can be used in controlling normal drive functions like starting the drive, choosing different speed or frequency references, or changing the setpoint for a PID loop control. In many cases where a fan, pump or other equipment is controlled with a *Timed function*, it is often required that there be the ability to override the timed program for a short duration. This timed override is called “*Boost time function*.” The boost is directly affecting selected *Timed function*(s) and switches it (them) on for a predefined time. The boost mode is typically activated through a digital input and its duration time is set in parameters.

Figure 1 illustrates the inputs for creating a schedule that can be managed through *Timed functions* using group 34 parameters.



**Figure 1: Parameter inputs for each timer to configure the *Timed Function* and Boost**

Table 1 provides the parameter groups that have individual parameters that *Timed functions* can be applied to.

**Table 1: Parameter group applications for Timed functions**

Parameter Group	Description
10 Standard DI/RO	Use Timed functions to activate relay outputs to activate other equipment such as a spray pump or add electric heat based on a schedule.
15 I/O extension module	Use Timed functions to activate relay output 4, 5 or digital output 1 in an extension module for drive I/O.
21 Start/stop	Use Timed functions to set a schedule for the motor preheat input source.
22 Speed reference selection	Use Timed functions to activate constant speed selections giving flexibility to operate at different speeds based on a schedule.
28 Frequency reference selection	Use Timed functions to activate constant frequency selections, giving the ability to operate at different set frequencies based on a schedule.
31 Fault functions	Use Timed functions to activate fault reset functions for a set amount of time.
40 Process PID	Use Timed functions to activate internal setup selection 1 and 2 for PID as well as set freeze point, tracking mode, and select which set of PID parameters are used.
76 Multipump configuration	Use Timed functions to activate PFC autochange or interlock.

### Developing a schedule

Prior to programming *Timed functions*, create a schedule using a tool like Excel to organize the way in which the timer will operate in the system. This can be as simple or complex as the operation requires. It is beneficial to outline requirements for start and stop time as well as after the timer activity for management of comfort in cooling or heating needs that this schedule will facilitate. Consider energy management, system capacity to reach set point, flexibility of peak hours, occupancy, and seasonal temperatures when developing the schedule.

#### Step 1 - How do we want to apply a *Timed function* to the operation of the system?

- What scheduled actions can *Timed functions* address in the equipment or operation?
- What days of the week, months, and seasonality impact the schedule that *Timed functions* will manage?
- Will there need to be the ability to extend a timer for a specific period based on a manual override input?
- What multiple day exception periods would be needed such as Christmas or Spring Break?
- What exception days, such as individual holidays like Labor Day or Memorial Day impact the schedule?

**Step 2 - Weekly scheduling consideration**

Over what period should a timer control an action each day of the week. Consider the start time and duration of that action and the state of that operation after the conclusion of that timer.

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Start	Start	Start	Start	Start	Start	Start
Stop/Duration	Stop/Duration	Stop/Duration	Stop/Duration	Stop/Duration	Stop/Duration	Stop/Duration
Action	Action	Action	Action	Action	Action	Action

**Step 3 - Boost time consideration**

There is also a boost function available that would extend the *Timed function* or activate the *Timed function* outside its normal schedule. This boost function can be applied to any of the three *Timed functions* and will extend the *Timed function* based on the activation source selected for the duration of time specified.

<i>Boost time function</i> characteristics
Active with which Timed function?
Activation source – On/Off or select source to activate
Duration – Days/Hours/Minutes

**Step 4 - Seasonal consideration**

What impact do the seasons have related to the *Timed function* used to manage a function. Consider the start of each season beginning with January 1 and apply the seasonal schedule based on current or future changes needed for the management of *Timed functions*. Each timer in a *Timed function* can be set to be active or inactive during each season.

Season 1	Season 2	Season 3	Season 4
Start Month/Day	Start Month/Day	Start Month/Day	Start Month/Day

**Step 5 - Exception schedule consideration 1-16**

After selecting the number of exception days/periods, assign an exception type to each for management in the setup of each timer. There are three options for extended exceptions by programming the start date and number of days, and 13 individual days that can be created as exceptions.

Exception period 1	Exception period 2	Exception period 3	Exception days 4-16
Start M/D	Start M/D	Start M/D	Month & Day
Length in days	Length in days	Length in days	

**Step 6 – Activation of timers in the *Timed functions***

After creating the timers, assign each timer to a *Timed function*.

Parameter	Description	Timers Active/Inactive
34.100	<i>Timed function 1</i>	1-12 options
34.101	<i>Timed function 2</i>	1-12 options
34.102	<i>Timed function 3</i>	1-12 options

**Step 7 – Assign *Timed functions* to the parameter**

Assign *Timed functions* to the parameter it will manage, see table 1.

Parameter	Description	Reference
Assigned	Description of parameter	<i>Timed function 1, 2, 3</i>

### Group 34 programming

Now that we have gone through the planning aspects for the action that is managed with the *Timed functions*, we will apply this information to the parameters in group 34 *Timed functions* based on the daily, weekly, monthly, and seasonal considerations as well as any exceptions needed in that schedule.

#### Step 1 - *Timed function* programming - Seasonal Schedules

Season 1	Season 2	Season 3	Season 4
34.60-Month/Date	34.61- Month/Date	34.62- Month/Date	34.63- Month/Date

#### Step 2 - *Timed function* programming - Activation of *Timed functions*

Parameter	Description	Value
34.10	<i>Timed functions enable</i>	Enable [1]/DI or activation ref

#### Step 3 - Timer configuration, each of the 12 timers consists of the following programable attributes:

- Monday through Sunday start and duration (Can set as active or inactive)
- Season1/Season2/Season3/Season4 (Can set as active or inactive)
- Exceptions/Holidays/Workdays (Can set as timer as active or inactive)

#### Configuration example *Timer 1 configuration* (default values)

Parameter	Description	Value	Active/Inactive
34.11	<i>Timer 1 configuration</i>	Monday	Inactive
		Tuesday	Inactive
		Wednesday	Inactive
		Thursday	Inactive
		Friday	Inactive
		Saturday	Inactive
		Sunday	Inactive
		Season 1	Active
		Season 2	Active
		Season 3	Active
		Season 4	Active
		Exceptions	Inactive
		Holidays	Inactive
		Workdays	Inactive

#### Expanded timer 1 parameters required

Parameter	Description	Value
34.11	<i>Timer 1 configuration</i>	0000 0111 1000 0000(reflected above)
34.12	<i>Timer 1 start time</i>	Hours   Minutes   Seconds 00:00:00
34.13	<i>Timer 1 duration</i>	Days   Hours   Minutes 00 00:00

Each of the 12 configurable timers have the timer configuration selections, start time, and duration that will be selected in parameters 34.11 – 34.46 (each having three parameters to configure).

**Step 4 – Timed function boost time function**

Boost time function detail
<i>Boost time function</i> 34.110
<i>Boost time activation source</i> 34.111
<i>Boost time duration</i> 34.112

**Step 5 - Timed function exceptions**

Total number of active exceptions
34.70

**Exception types**

Parameter	Description	Value	Active/Inactive
34.71	<i>Exception types</i>	Exception 1 (period)	Holiday or Workday
		Exception 2 (period)	Holiday or Workday
		Exception 3 (period)	Holiday or Workday
		Exception 4 (day)	Holiday or Workday
		Exception 5 (day)	Holiday or Workday
		Exception 6 (day)	Holiday or Workday
		Exception 7 (day)	Holiday or Workday
		Exception 8 (day)	Holiday or Workday
		Exception 9 (day)	Holiday or Workday
		Exception 10 (day)	Holiday or Workday
		Exception 11 (day)	Holiday or Workday
		Exception 12 (day)	Holiday or Workday
		Exception 13 (day)	Holiday or Workday
		Exception 14 (day)	Holiday or Workday
		Exception 15 (day)	Holiday or Workday
		Exception 16 (day)	Holiday or Workday

By defining each exception as a workday or holiday, each timer allows you to define whether the Timed function is active during that period or day.

**Exception schedule considerations 1-16**

Exception period 1	Exception period 2	Exception period 3	Exception day 4	Exception day 5	Exception day 6	Exception day 7	Exception day 8
34.72 & 34.72	34.74 & 34.75	34.76 & 34.77	34.78	34.79	34.80	34.81	34.82
Exception day 9	Exception day 10	Exception day 11	Exception day 12	Exception day 13	Exception day 14	Exception day 15	Exception day 16
34.83	34.840	34.85	34.86	34.87	34.88	34.89	34.90

**Step 6 – Activation of timers for each *Timed Function***

Parameter	Description	Timers Active/Inactive
34.100	<i>Timed function 1</i>	1-12 options
34.101	<i>Timed function 2</i>	1-12 options
34.102	<i>Timed function 3</i>	1-12 options

## Configuration Examples

### Example #1 electric heat enable for AHU

HVACR installations may use additional electric heat for the morning warmup of a facility. These systems may have thermostats that do not allow for lockout of the system to call for electric heat later in the day, after the space is conditioned and the electric heat is no longer needed. To address this in a retrofit application, we will use the *Timed functions* in an ACH580 drive and one of the drives relays acting as an interlock that will only allow the electric heater to operate in the AHU when the relay output is active.

After considering the operational needs of two hours of electric heat availability Monday through Friday from 6 a.m. to 8 a.m. and 10 a.m. till 12 a.m. on Saturday of each week, we will organize a schedule and then program the following in group 34 *Timed functions* in the drive.

- Create a timer (*Timer 1*) tied to *Timed function 1* that will enable a relay output on the drive (RO3) from 6 a.m. till 8 a.m., Monday through Friday.
- Create a timer (*Timer 2*) tied to *Timed function 1* that will enable a relay output on the drive (RO3) from 10 a.m. till 12 a.m., on Saturday.
- We will also create a boost timer that will activate the relay and allow a 30-minute availability tied to *Timed function 1* for the electric heat if DI6 is activated in the drive.

### Organizing the schedule for Example #1

#### Step 1 - Example #1 electric heat interlock (Season 1, date 01/01 active by default when *Timed functions* is set to active)

Season 1	Season 2	Season 3	Season 4
Active	Not used	Not used	Not used

#### Step 2 - Example #1 electric heat interlock weekly scheduling considerations

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Start - 6 a.m.	Start - 6 a.m.	Start - 6 a.m.	Start - 6 a.m.	Start - 6 a.m.	Start - 10 a.m.	Not active
Duration - 2 hours	Duration - 2 hours	Duration - 2 hours	Duration - 2 hours	Duration - 2 hours	Duration - 2 hours	
Activation of RO3	Activation of RO3	Activation of RO3	Activation of RO3	Activation of RO3	Activation of RO3	

#### Step 3 - Example #1 electric heat interlock *Boost time function*

Boost Time function characteristics
Active with which Timed function? <i>Timed Function 1</i>
Activation source? DI6
Duration – Days/Hours/Minutes set to 30 minutes

**Example #1 - Group 34 programming**

After understanding scheduling based on daily, weekly, monthly, and seasonal considerations, enter this information into the parameters to apply them.

**Step 1 - Example #1 programming electric heat interlock activation of *Timed functions***

Parameter	Description	Value
34.10	<i>Timed functions enable</i>	<b>Enable [1]</b>

**Step 2 - Example #1 programming electric heat interlock seasonal schedule (Season 1, date 01/01 active by default when *Timed functions* is set to active)**

Season 1	Season 2	Season 3	Season 4
34.60 – <b>[01/01]</b>	34.61 – Not used	34.62 - Not used	34.63 - Not used

**Step 3 - Example #1 *Timer 1 configuration* electric heat interlock Monday through Friday operation**

Parameter	Description	Value	Active/Inactive
34.11	<i>Timer 1 configuration</i>	Monday	<b>[Active]</b>
		Tuesday	<b>[Active]</b>
		Wednesday	<b>[Active]</b>
		Thursday	<b>[Active]</b>
		Friday	<b>[Active]</b>
		Saturday	<b>[Inactive]</b>
		Sunday	<b>[Inactive]</b>
		Season 1	<b>[Active]</b>
		Season 2	<b>[Inactive]</b>
		Season 3	<b>[Inactive]</b>
		Season 4	<b>[Inactive]</b>
		Exceptions	<b>[Inactive]</b>
		Holidays	<b>[Inactive]</b>
		Workdays	<b>[Inactive]</b>

**Expanded configuration *Timer 1* parameters Monday through Friday operation**

Parameter	Description	Value
34.11	<i>Timer 1 configuration</i>	<b>[0000 0000 1001 1111] (reflected above)</b>
34.12	<i>Timer 1 start time</i>	<b>[06:00:00 AM]</b>
34.13	<i>Timer 1 duration</i>	<b>[0:02:00]</b>



**Step 4 - Example #1 *Timer 2 configuration* electric heat interlock Saturday operation**

Parameter	Description	Value	Active/Inactive
34.14	<i>Timer 2 configuration</i>	Monday	[Inactive]
		Tuesday	[Inactive]
		Wednesday	[Inactive]
		Thursday	[Inactive]
		Friday	[Inactive]
		Saturday	[Active]
		Sunday	[Inactive]
		Season 1	[Active]
		Season 2	[Inactive]
		Season 3	[Inactive]
		Season 4	[Inactive]
		Exceptions	[Inactive]
		Holidays	[Inactive]
		Workdays	[Inactive]

**Expanded configuration *Timer 2* parameters Saturday operation**

Parameter	Description	Value
34.14	<i>Timer 2 configuration</i>	[0000 0000 1010 0000] (reflected above)
34.15	<i>Timer 2 start time</i>	[10:00:00 AM]
34.16	<i>Timer 2 duration</i>	[00:02:00]

**Step 5 - Example #1 programming electric heat interlock *Boost time function* Monday through Friday**

Boost time function detail
<i>Boost time function</i> 34.110 [Timed Function 1]
<i>Boost time activation source</i> 34.111 [DI6]
<i>Boost time duration</i> 34.112 [30 minutes]

**Step 6 - Example #1 activation of timers for each *Timed Function* for electric heat interlock**

Parameter	Description	Timers Active/Inactive
34.100	<i>Timed function 1</i>	[Timer 1] [Timer 2]

**Step 7 - Example #1 assigning *Timed function* to activation of relay for electric heat interlock**

Parameter	Description	Reference
10.30	<i>RO3 source</i> (Relay output 3)	[Timed Function 1]

**Example #2 Scheduling PID setpoint based on season or time for stand-alone HVACR systems**

Some HVACR installations may require the ability to alternate between two different internal PID setpoints based on the time of year. In the operation we are supporting below, we have a set point for operation of the system from May 1<sup>st</sup> through October 31<sup>st</sup>. Then an alternative internal PID set point to apply from November 1<sup>st</sup> till May 1<sup>st</sup>. To address this, we can use *Timed functions* in the ACH580 drive to alternate between internal PID set points throughout the year without any outside controls prompting the change based on season.

In example #2, after considering the requirements listed above, we will walk through how to organize the schedule and then program group 34 *Timed functions*.

- Create a seasonal schedule for the action controlled by *Timed functions*.
- Create a timer (*Timer 1*) tied to *Timed function 1* that will enable *Process PID set 1 internal setpoint 1* for the summer season from 5/1 till 11/1.
- Create a timer (*Timer 2*) tied to *Timed function 2* that will enable *Process PID set 1 internal setpoint 2* for the winter season from 11/1 till 5/1.

**Organizing the schedule for Example #2**

**Step 1 - Example #2 Process PID set1 internal set point alternation based on seasonal schedule**

Season 1	Season 2	Season 3	Season 4
Active [05/01]	Active [11/01]	Not used	Not used

**Step 2 - Example #2 Process PID set1 internal set point alternation based on seasonal schedule Summer**

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Start – 0:00:00	Start – 0:00:00	Start – 0:00:00	Start – 0:00:00	Start – 0:00:00	Start – 0:00:00	Start – 0:00:00
Duration – 1 Day	Duration - 1 Day	Duration - 1 Day	Duration - 1 Day	Duration - 1 Day	Duration - 1 Day	Duration - 1 Day
<i>Process PID set 1 internal setpoint 1</i>	<i>Process PID set 1 internal setpoint 1</i>	<i>Process PID set 1 internal setpoint 1</i>	<i>Process PID set 1 internal setpoint 1</i>	<i>Process PID set 1 internal setpoint 1</i>	<i>Process PID set 1 internal setpoint 1</i>	<i>Process PID set 1 internal setpoint 1</i>
Summer	Summer	Summer	Summer	Summer	Summer	Summer

**Step 3 - Example #2 Process PID set1 internal set point alternation based on seasonal schedule Winter**

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Start – 0:00:00	Start – 0:00:00	Start – 0:00:00	Start – 0:00:00	Start – 0:00:00	Start – 0:00:00	Start – 0:00:00
Duration – 1 Day	Duration - 1 Day	Duration - 1 Day	Duration - 1 Day	Duration - 1 Day	Duration - 1 Day	Duration - 1 Day
<i>Process PID set 1 internal setpoint 2</i>	<i>Process PID set 1 internal setpoint 2</i>	<i>Process PID set 1 internal setpoint 2</i>	<i>Process PID set 1 internal setpoint 2</i>	<i>Process PID set 1 internal setpoint 2</i>	<i>Process PID set 1 internal setpoint 2</i>	<i>Process PID set 1 internal setpoint 2</i>
Winter	Winter	Winter	Winter	Winter	Winter	Winter

**Example #2 Group 34 programming**

After understanding *Timed functions* based on seasonal considerations, enter this information into the parameters to apply them.

**Step 1 - Example #2 Process PID set1 internal set point alternation *Timed functions* activation**

Parameter	Description	Value
34.10	<i>Timed functions</i> enable	<b>Enable [1]</b>

**Step 2 - Example #2 Process PID set1 internal set point alternation programming seasonal schedule**

Season 1	Season 2	Season 3	Season 4
34.60 - <b>[05/01]</b>	34.61 - <b>[11/01]</b>	34.62 - Not used	34.63 – Not used

**Step 3 - Example #2 Timer 1 PID set1 internal set point 1 alternation summer**

Parameter	Description	Value	Active/Inactive
34.11	Timer 1 configuration	Monday	<b>[Active]</b>
		Tuesday	<b>[Active]</b>
		Wednesday	<b>[Active]</b>
		Thursday	<b>[Active]</b>
		Friday	<b>[Active]</b>
		Saturday	<b>[Active]</b>
		Sunday	<b>[Active]</b>
		Season 1	<b>[Active]</b>
		Season 2	<b>[Inactive]</b>
		Season 3	<b>[Inactive]</b>
		Season 4	<b>[Inactive]</b>
		Exceptions	<b>[Inactive]</b>
		Holidays	<b>[Inactive]</b>
		Workdays	<b>[Inactive]</b>

**Expanded configuration *Timer 1 PID set1 internal set point 1* summer**

Parameter	Description	Value
34.11	<i>Timer 1 configuration</i>	<b>[0000 0000 1111 1111] (reflected above)</b>
34.12	<i>Timer 1 start time</i>	<b>[00:00:00]</b>
34.13	<i>Timer 1 duration</i>	<b>[01 00:00]</b>

**Step 4 - Example #2 Timer 2 PID set1 internal setpoint 2 winter**

Parameter	Description	Value	Active/Inactive
34.14	<i>Timer 2 configuration</i>	Monday	[Active]
		Tuesday	[Active]
		Wednesday	[Active]
		Thursday	[Active]
		Friday	[Active]
		Saturday	[Active]
		Sunday	[Active]
		Season 1	[Inactive]
		Season 2	[Active]
		Season 3	[Inactive]
		Season 4	[Inactive]
		Exceptions	[Inactive]
		Holidays	[Inactive]
		Workdays	[Inactive]

**Expanded configuration Timer PID set1 internal setpoint 2 winter**

Parameter	Description	Value
34.14	<i>Timer 2 configuration</i>	[0000 0001 0111 1111] (reflected above)
34.15	<i>Timer 2 start time</i>	[00:00:00 A.M.]
34.16	<i>Timer 2 duration</i>	[01 00:00]

**Step 5 - Example #2 PID set1 internal setpoint activation of timers for each Timed Function**

Parameter	Description	Timers Active/Inactive
34.100	<i>Timed function 1</i>	[Timer 1]
34.101	<i>Timed function 2</i>	[Timer 2]
34.102	<i>Timed function 3</i>	Not used

**Step 6 - Example #2 PID set1 internal setpoint assigned to Timed function**

Parameter	Description	Reference
40.19	<i>Process PID set 1 internal setpoint 1</i>	[Timed Function 1]
40.20	<i>Process PID set 1 internal setpoint 2</i>	[Timed Function 2]

### Example #3 constant frequency (speed) application

Many HVACR applications require constant frequency operation but alternate that constant frequency throughout their operating schedule based on occupancy, seasonal weather, or operation needs. In example #3 the system operates at 60 Hz from 6 a.m. till 6 p.m., then at 40 Hz from till 6:00 a.m. the next day, Monday through Saturday from May till September. It operates at 50 Hz from 6 a.m. till 6 p.m. Monday through Saturday, then 40 Hz till 6 a.m. from September till May. On Sunday, the system always operates at 40 Hz throughout the day. They do not operate this system on a schedule during the Thanksgiving break or Christmas break, and the system will run at 40 Hz all day long during those holidays. There is a requirement to have the option to run the system at 60 Hz based on operational demand for 30 minutes.

In example #3, after considering the operational needs and exception periods, we organize a schedule and then program the following in Group 34 *Timed functions* in the drive.

- Configure parameter 20.03 to [1] *Always on* and set parameter 30.13 to [40 Hz]. This will operate the motor at 40 Hz when the *Timed Functions* are not active. (Monday through Saturday after 6:00 pm. till 6 a.m. and Sunday)
- Create a timer (*Timer 1*) tied to *Timed function 1* that will enable *Constant frequency 1* Monday through Saturday operation, daytime operation for season 1 summer.
- Create a timer (*Timer 2*) tied to *Timed function 2* that will enable *Constant frequency 2* Monday through Saturday operation, day operation for season 2 winter.
- Create two exception periods for the Thanksgiving and Christmas periods.
- Create a boost timer for *Timed function 1* activated by DI6.

### Organizing the schedule

#### Step 1 – Example #3 constant frequency application seasonal schedules

Season 1	Season 2	Season 3	Season 4
Active 05/01	Active 09/01	Not used	Not used

#### Step 2 – Example #3 constant frequency application weekly scheduling considerations for May - September

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Start - 6 a.m.	Start - 6 a.m.	Start - 6 a.m.	Start - 6 a.m.	Start - 6 a.m.	Start - 6 a.m.	Not active
Duration - 12 hours	Duration - 12 hours	Duration - 12 hours	Duration - 12 hours	Duration - 12 hours	Duration - 12 hours	
Constant Frequency 60 Hz	Constant Frequency 60 Hz	Constant Frequency 60 Hz	Constant Frequency 60 Hz	Constant Frequency 60 Hz	Constant Frequency 60 Hz	
Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Start – 6 p.m.	Start – 6 p.m.	Start – 6 p.m.	Start – 6 p.m.	Start – 6 p.m.	Start – 6 p.m.	00:00:00
Duration - 12 hours	Duration - 12 hours	Duration - 12 hours	Duration - 12 hours	Duration - 12 hours	Duration - 12 hours	Duration- 24 hours
Constant Frequency 40 Hz	Constant Frequency 40 Hz	Constant Frequency 40 Hz	Constant Frequency 40 Hz	Constant Frequency 40 Hz	Constant Frequency 40 Hz	Constant Frequency 40 Hz

**Step 3 – Example #3 constant frequency application weekly scheduling considerations for September - May**

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Start - 6 a.m.	Start - 6 a.m.	Start - 6 a.m.	Start - 6 a.m.	Start - 6 a.m.	Start - 6 a.m.	Not active
Duration - 12 hours	Duration - 12 hours	Duration - 12 hours	Duration - 12 hours	Duration - 12 hours	Duration - 12 hours	
Constant Frequency 50 Hz	Constant Frequency 50 Hz	Constant Frequency 50 Hz	Constant Frequency 50 Hz	Constant Frequency 50 Hz	Constant Frequency 50 Hz	
Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Start - 6 p.m.	Start - 6 p.m.	Start - 6 p.m.	Start - 6 p.m.	Start - 6 p.m.	Start - 6 p.m.	00:00:00
Duration - 12 hours	Duration - 12 hours	Duration - 12 hours	Duration - 12 hours	Duration - 12 hours	Duration - 12 hours	Duration - 24 hours
Constant Frequency 40 Hz	Constant Frequency 40 Hz	Constant Frequency 40 Hz	Constant Frequency 40 Hz	Constant Frequency 40 Hz	Constant Frequency 40 Hz	Constant Frequency 40 Hz

**Step 4 – Example #3 constant frequency application boost time**

Boost Time function characteristics
Active with which <i>Timed function</i> ? <b>Timed function 1</b>
Activation source – On/Off or select source to activate <b>DI6</b>
Duration – Days/Hours/Minutes <b>30 minutes</b>

**Step 5 – Example #3 constant frequency application exception schedule considerations 1-16**

Exception period 1	Exception period 2
November 27th	December 23rd
3 days	4 days

**Example #3 Group 34 programming**

After understanding scheduling based on daily, weekly, and seasonal considerations, as well as the boost functions and exception periods needed, enter this information into the parameters to apply it.

**Step 1 – Example #3 programming constant frequency application seasonal schedule**

Season 1	Season 2	Season 3	Season 4
34.60- [05/01]	34.61- [09/01]	34.62 - Not used	34.63 – Not used

**Step 2 – Example #3 programming constant frequency application activation of *Timed functions***

Parameter	Description	Value
34.10	<i>Timed functions enable</i>	<b>Enable [1]</b>

**Step 3 – Example #3 timer 1 constant frequency application (60 Hz) operation on Monday through Saturday season 1**

Parameter	Description	Value	Active/Inactive
34.11	<i>Timer 1 configuration</i>	Monday	<b>[Active]</b>
		Tuesday	<b>[Active]</b>
		Wednesday	<b>[Active]</b>
		Thursday	<b>[Active]</b>
		Friday	<b>[Active]</b>
		Saturday	<b>[Active]</b>
		Sunday	<b>[Inactive]</b>
		Season 1	<b>[Active]</b>
		Season 2	<b>[Inactive]</b>
		Season 3	<b>[Inactive]</b>
		Season 4	<b>[Inactive]</b>
		Exceptions	<b>[Active]</b>
		Holidays	<b>[Inactive]</b>
		Workdays	<b>[Active]</b>

**Expanded timer 1 configuration (60 Hz) operation on Monday through Saturday season 1**

Parameter	Description	Value
34.11	<i>Timer 1 configuration</i>	<b>0010 1000 1011 1111(reflected above)</b>
34.12	<i>Timer 1 start time</i>	<b>[06:00:00 AM]</b>
34.13	<i>Timer 1 duration</i>	<b>[00 12:00]</b>

**Step 4 – Example #3 timer 2 configuration constant frequency application (50 Hz) operation Monday through Saturday season 2**

Parameter	Description	Value	Active/Inactive
34.20	<i>Timer 2 configuration</i>	Monday	[Active]
		Tuesday	[Active]
		Wednesday	[Active]
		Thursday	[Active]
		Friday	[Active]
		Saturday	[Active]
		Sunday	[Inactive]
		Season 1	[Inactive]
		Season 2	[Active]
		Season 3	[Inactive]
		Season 4	[Inactive]
		Exceptions	[Active]
		Holidays	[Inactive]
		Workdays	[Active]

**Expanded configuration timer 2 (50 Hz) operation season 2**

Parameter	Description	Value
34.20	<i>Timer 2 configuration</i>	<b>0010 1001 0011 1111(reflected above)</b>
34.21	<i>Timer 2 start time</i>	<b>06:00:00 AM</b>
34.22	<i>Timer 2 duration</i>	<b>[00:12:00]</b>

**Step 7 - Example #3 constant frequency application boost function**

Boost Time function characteristics
<i>Boost time function</i> 34.110 [ <b>Timed Function 1</b> ]
<i>Boost time activation source</i> 34.111 [ <b>DI6</b> ]
<i>Boost time duration</i> 34.112 [ <b>30 minutes</b> ]

**Step 8 - Example #3 constant frequency application exceptions**

Total number of active exceptions
34.70 – [ <b>2</b> ]

**Exception types**

Parameter	Description	Value	Active/Inactive
34.71	<i>Exception types</i>	Exception 1 (period)	[Holiday]
		Exception 2 (period)	[Holiday]



## Exception schedule considerations 1 & 2

Exception period 1	Exception period 2
34.72 [11/27]	34.74 [12/23]
34.73 [3]	34.75 [4]

## Step 9 – Example #3 constant frequency application timers for each *Timed function*

Parameter	Description	Timers Active/Inactive
34.100	<i>Timed function 1</i>	[Timer 1]
34.101	<i>Timed function 2</i>	[Timer 2]

## Step 10- Example #3 constant frequency application assigning *Timed Functions* to the reference

Parameter	Description	Reference
20.03	<i>Ext1 in1 source</i>	[1] Always on
30.13	<i>Minimum frequency</i>	[40 Hz]
28.22	<i>Constant frequency sel1</i>	[Timed function 1]
28.23	<i>Constant frequency sel2</i>	[Timed function 2]
28.26	<i>Constant frequency 1</i>	[60 Hz]
28.27	<i>Constant frequency 2</i>	[50 Hz]

## Other considerations when using *Timed functions*

### Time Sync through automation system, or manually at the drive.

For the most accurate *Timed function* capabilities, synchronizing the real time clock in the drive to an automation system that is linked to an NTP server or update the drive's clock through the panel interface during regular maintenance.

It is important to implement a time management system related to the drives when using *Timed functions* to manage a schedule. If left unsynchronized, in certain ambient temperature conditions a drives internal clock may drift 75 seconds to 4 minutes a month.

### Bypass considerations

Please note that if a ACH580 drive has an E-Clipse bypass and will use *Timed functions*, additional control wiring, and parameter adjustments need to be made to ensure that the drive is not setup to be operating at zero speed. Please see ABB Technical Note 018 for guidance on control wiring and the needed parameter changes.

### Summary

Most heating and cooling systems that employ drives have multiple functions that are based on time schedules. The *Timed functions* within the drive offers an effective way to implement a schedule of operation. It provides options for start and stop operation, constant speed alternation, and PID management among other features. They can be used to manage basic processes or control a piece of equipment such as an air handler without the investment of a costly building management system.