TC-05

User guide

CONTENT

1: TECHNICAL DESCRIPTION

The electronics are built around a microcomputer to provide maximum flexibility
and advanced error handling.
TC-5 has 2X16-character alphanumeric display and 16 buttons numeric
keyboard for easy communication between machine and user.

The device can control 4 groups G1-G4 and 4 extra Outputs
that can be used for example. waiting lamps.
Maximum power each output is 100W, 600W maximum total power.

All outputs are zero- and phase- triggered to minimize noise and transients.
Lampstatus is detected continuously in the positive and negative phase.
Input data is compared with Output data. Following errors can be detected.

1. Triacerror. Triac leads only in one direction.
2. Triacerror. Triac does not lead in any direction.
3. Voltage on output that should be off caused by short circuit or leakage.
4. Other failure of the electronics that gives false lampdata.
5. **" CHECK FUSE "** is displayed if the device starts with blown fuse.

If there is no Voltage on an output that should be on, message will be.
"**NO OUTP. VOLTAGE**" and information about wich output.
 If voltage is present on the output that should be off, message will be
"HOSTILE VOLTAGE "and information about wich output.

GREEN-CONFLICT-CHECK

Green-conflict check is configured by switches accessible from left outside the TC-5.
The groups whose green lights are hostile to each other must be "ON"
There are 6 switches 1-6 correspond to G1-G2, G1-G3, G1-G4, G2, G3, G2, G4 and G3-G4.
Ex. For Prog1 set "ON" SW 2,3,4,5.
When starting up TC-5 the program will test the configuration and if the settings
not correspond to the program application error will occur and the display shows f.ex.
"AJUSTMENT ERROR set switch 1 ON"

GREEN-CONFLICT-ERROR

Green-conflict due to external short circuit or voltage leakage
 is detected by the microprocessor via the output triac-control.
 The display shows for example. **"GREECONFL. G1-G2 "**which means
 green-conflict between Group 1 and Group-2.

For other errors, for example. computer malfunctions, there is an external circuit independent
from the microprocessor that detect green-conflicts and if occurs all outputs will be switched off.

LAMP-LOAD CONTROL

The TC-5 has 4 independent power-monitoring circuits.
Connect output that will be monitored to the input of the channel.
Connect the output from the channel to the monitored load. (Lamp)
Power level is set in the configuration menu **LOAD-1, -2, -3, -4**
When set power is lower than the set value (0-99W), the device
goes into Error mode and the display shows "**POWER FAILURE 1,2,3 or 4.**"
The accuracy of the set power value is approximately ± 2W.
TC-5 also shows **"POWER FAILURE 1,2,3 or 4."**
if power exceeds 100 W.

INPUTS

TC-5 has 12 12VDC . Inputs for detectors (INPUT-1-12).
4   inputs for push buttons (230VAC).
2 inputs (INPUT to 13-14) for outside switch sets Yellow blink or Lamps OFF.

OTHER

All timers and configuration register are stored in EE-PROM, which retains
Its data when power is switched off.
Programming of the timers, etc. required access code (4 digits).
The access code can be changed in the configuration menu by the user.
Factory default code 4-3-2-1.
All types of errors message are saved last at error message in the main menu.
Error message can be deleted with code + CLR.

2: PROGRAMS

TC-5 contains 5 programs (P1-P5).

P1: RETURN TO GREEN Group1-2

Pedestrian cross walk with return to green lights in the vehicle group1-2.
Vehicle Group 1 and Group-2 parallel, Bicycles Group-3 and Pedestrians Group-4.
Extension of vehicle timers via detector loops 1-6.
Detector 7 provides extended green bicycle-go-phase.
Detector 8 provide variable period-go- phase.

Green Conflict switch setting. Switch 1-2-3-4-5-6
(G1-G2 OFF) (ON G1-G3) (G1-G4 ON) (ON G2-G3) (G2-G4 ON) (G3-G4 OFF)

P2: RETURN TO LAMP OFF

Pedestrian cross walk with return to off signal.
Vehicle Group-1 , Bicycles Group-3 and Pedestrians Group-4.
Extension of vehicle phase via detector loops 1-4.
Detector 5 provides variable greenperiod bicycle-go-phase.
Detector 6 provides variable redperiod bicycle-go-phase.
External sync from the detector 4 can be selected in the configuration.
Green Conflict switch setting: G1-G2 and G1-G3.

P3: SHUTTELSIGNAL

Shuttelsignal Vehicles for Groups 1 and 2.
Variable periods Group-1 via detectors 1-3.
Variable periods Group-2 via detectors 4-6.
Detector 7 and 8 makes it possible to switch between two different
Greenperiod for each Group-1 and -2

Green Conflict switch setting: G1-G2

P4: RETURN ALL RED

Applications for four Groups return all RED with LOVHRA functions.
Two different operating modes are available and are selected in the configuration.
2+2 groups (ON) or four separate groups (OFF)

Extension and notification Group.1 through detectors 1-3.
Extension and notification Group.2 through detectors 4-6.
Extension and notification Group.3 through detectors 7-9.
Extension and notification Group.4 through detectors 10-12.

In CONFIGURATION select 2 +2 groups (ON)
Green Conflict switches added: G1-G3, G1-G4, G2, G3, G2-G4

In CONFIGURATION select 2+2 groups (OFF) means
All Groups in conflict.
Green Conflict switches added: All Switches 1-6 ON

P5: TEST PROGRAM

Test program has only two timers Lamp ON and Lamp OFF.
Setting timer Step-ON and Step-OFF sets Output-1 ON-OFF
Output-2 ON-OFF Output-3 ON-OFF and so on
If Step-ON and Step-OFF is set to zero detector Inputs will
reflect to the Outputs. F.ex Input-1 set Lamp-1 ON or OFF.

3: SETTING

MENUS

When power is swithed on the Display shows 1 second
f.ex.   **"TC-5 ABC-CAD AB"**
          "100215 Ver:2.14 "

Then it Shows latest Program selection
F.ex   **"PROGRAM   "**
         "P1 NORM. GREEN"

Press "MENU" jumps between menus

MENUS

PROGRAMS, CONFIGURATION
TIMERS and interval TIMERS

Stepping through the menus is done with arrow keys.

PROGRAMS

When selecting the program step it up to the desired application and
then enter the security code and the display starts flashing.
Press "SAVE"

Available programs

"P1 Normal Green "
"P2 Normal OFF   "
"P3 Shuttelsignal   "
"P4 Normal RED   "
"P5 TESTPROGRAM"
"P6 Reserved   "

CONFIGURATION

Change configurations for the program selected.
Enter the security code, when data starts to flash
Change data and press "Save"
Note that only registers relevant to selected program are displayed.

Available configuration registers

'Blktime t/s   '
'Group-2   '
'Group-3   '
'Group-4   '
'G-blk error   '
'Allred   '
'Yellblk   '
'English   '
'G5 Control   '
'Maxtime reg.   '
'Extern sync   '
'2+2 Groups   '
'G3,G4 RED   '
'GREENLAMPS   '
'LOAD.L-1   W   '   If power less than set all Lamps are turned off
'LOAD.L-2   W   '   "
'LOAD.L-3   W   '   "
'LOAD.L-4   W   '   "
'Sensitiv.   '
'Startblink   s   '
'Start yel   s   '
'Start red   s   '
'Writecode   '
'RedImpcontr.1 G   '
'RedImpcontr.2 G   '
'RedImpcontr.3 G   '
'RedImpcontr.4 G   '
'Load.H-1   W   '   If power less than set V-Lamp-4 are turned on
'Load.H-2   W   '   "
'Load.H-3   W   '   "
'Load.H-4   W   '   "

Timers

Select data to be changed, enter the security code, when data starts to flash
Change data and press "Save"
Note that only registers relevant to selected program are displayed.

Available timers

'Red+Yellow   . s'
'Mingrn G1   s'
'Mingrn G2   s'
'Mingrn G3   s'
'Mingrn G4   s'
'Maxgrn G1   s'
'Maxgrn G2   s'
'Maxgrn G3   s'
'Maxgrn G4   s'
'Grnblk_G1   s'
'Grnblk_G2   s'
'Grnblk_G3   s'
'Grnblk_G4   s'
'Redtime G1   s'
'Redtime G2   s'
'Redtime G3   s'
'Redtime G4   s'
'Yeltime G1   s'
'Yeltime G2   s'
'Yeltime G3   s'
'Yeltime G4   s'
'Var.redt G1   s'
'Var.redt G2   s'
'Var.redt G3   s'
'Var.redt G4   s'
'Var.Yell G1   s'
'Var.Yell G2   s'
'Var.Yell G3   s'
'Var.Yell G4   s'
'Offtime G1   s'
'Offtime G2   s'
'Offtime G3   s'
'Offtime G4   s'
'Backkreg G1   s'
'Backkreg G2   s'
'Backkreg G3   s'
'Backkreg G4   s'
'Privil.G4   s'
'Step ON   . s'
'Step OFF   . s'
'Y-blk b Ch   s'
'Timeout   s'

Interval-Timers

Select data to be changed, enter the security code, when data starts to flash
Change data and press "Save"

Available Interval-timers

'Interval.1   . s'
'Interval.2   . s'
'Interval.3   . s'
'Interval.4   . s'
'Interval.5   . s'
'Interval.6   . s'
'Interval.7   . s'
'Interval.8   . s'
'Interval.9   . s'
'Interv.10   . s'
'Interv.11   . s'
'Interv.12   . s'
'Interv.13   . s'
'Interv.14   . s'
'Interv.15   . s',
'Interv.16   . s'
'Intv.off-1   . s'
'Intv.off-2   . s'
'Intv.off-3   . s'
'Intv.off-4   . s'
'Intv.off-5   . s'
'Intv.off-6   . s'
'Intv.off-7   . s'
'Intv.off-8   . s'
'Intv.off-9   . s'
'Intv.off10   . s'
'Intv.off11   . s'
'Intv.off12   . s'
'Intv.Yel-1   . s'
'Intv.Yel-2   . s'
'Intv.Yel-3   . s'
'Intv.Yel-4   . s'
'Intv.Yel-5   . s'
'Intv.Yel-6   . s'
'Intv.Yel-7   . s'
'Intv.Yel-8   . s'
'Intv.Yel-9   . s'
'Intv.Yel10   . s'
'Intv.Yel11   . s'
'Intv.Yel12   . s'
'Intv.bck-1   . s'
'Intv.bck-2   . s'
'Intv.bck-3   . s'

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'Intv.bck-4   . s'
'Intv.bck-5   . s'
'Intv.bck-6   . s'
'Intv.bck-7   . s'
'Intv.bck-8   . s'
'Intv.bck-9   . s'
'Intv.bck10   . s'
'Intv.bck11   . s'
'Intv.bck12   . s'
'Intv.Red-1   . s'
'Intv.Red-2   . s'
'Intv.Red-3   . s'
'Intv.Red-4   . s'
'Intv.Red-5   . s'
'Intv.Red-6   . s'
'Intv.Red-7   . s'
'Intv.Red-8   . s'
'Intv.Red-9   . s'
'Intv.Red10   . s'
'Intv.Red11   . s'
'Intv.Red12   . s'
```

Programming with Flip 2.4.6

Flip is a free program that can be downloaded from Atmels homepage
http://www.atmel.com/dyn/products/tools_card.asp?tool_id=3886

1. Install FLIP 2.4.6

2. Turn off TC-5 and set DIP-switch-8 (ON).

3. Connect Serial cable.

4. Turn TC-5 ON. (Display shows dark rectangles on upper row).

5. Start PC-programFlip.

6. First time the progam is used select "Device select"
    "T89C51AC2". Save by File-save configuration.

7. Select Settings- Communication-RS232-Connect.
8. Botton "Start Application" turns red.

9. Select File LoadHEX and load Hexfile for example TC05_2.20.hex.

10. Mark "program" och press "Run"

11. When programming is finished turn off TC-5 and set switch-8 OFF.
     When TC-5 is turned ON the Display should show the new
      version number (in this case TC05_2.20).

CONNECTIONS TC-5

Group: 1
Group: 2
Group: 3
Group: 4
W-Lamps

MAX 100W PER OUTPUT
TOTAL POWER MAX 600W

G1-RED
G1-YELLOW
G1-GREEN
G2-RED
G2-YELLOW
G2-GREEN
G3-RED
G3-YELLOW
G3-GREEN
G4-RED
G4-YELLOW
G4-GREEN
G5-LAMP1
G5-LAMP2
G5-LAMP3
G5-LAMP4

INPUT-1
INPUT-2
INPUT-3
INPUT-4

REDLAMP
CONTROL
INPUTS

OUTPUT-1
OUTPUT-2
OUTPUT-3
OUTPUT-4

REDLAMP
CONTROL
OUTPUTS

RS-232

SIGNAL ON/OFF
SAVE
MENU
CLR

1 2 3
4 5 6
7 8 9
← 0 →

TRAFFIC CONTROLLER TC-5   CE

12V INPUTS
INPUT-1
INPUT-2
INPUT-3
INPUT-4
INPUT-5
INPUT-6
INPUT-7
INPUT-8
INPUT-9
INPUT-10
INPUT-11
INPUT-12
INPUT-13
INPUT-14
+12V
MINUS (12V)

230VAC INPUTS
INPUT-15
INPUT-16
INPUT-17
INPUT-18

GREEN-
CONFLICT
SETTINGS

G1-G2
G1-G3
G1-G4
G2-G3
G2-G4
G3-G4
TEST-1
TEST-2

FUSE 3AT
CERAMIC

OFF ON

230VAC OUT
SUPPLY 230V P
SUPPLY 230V N
SUPPLY GROUND

DETECTORS

Yellow blink
Signal OFF

230VAC
Inputs

230V Phase
230V Null
GROUND